White Paper

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White Paper Report

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Digital Humanities Implementation Grant
METADATA GAMES
Improving access to humanities artifacts

Project Director: Mary Flanagan

Grantee institution: Dartmouth College

Introduction / Executive Summary

Our team was awarded a Digital Humanities Implementation Grant in 2012 to implement a software system that would use game play to allow users to contribute high-quality descriptive information about digital collections of humanities materials held by cultural heritage institutions. The resulting open-source and easily customizable software system, Metadata Games (MG), uses computer games to allow the public to contribute (crowdsource) information about artifacts in libraries and archives, as these institutions strive to bring their collections into the digital age.

Crowdsourcing has been utilized across many domains over the past decade. It is a set of techniques that help scientists, librarians, and many other disciplinary areas acquire new knowledge through mass contributions. One of the most known illustrations of the problem-solving capabilities of crowdsourcing is the case of *Foldit* at the University of Washington. *Foldit* players helped unlock the structure of an AIDS-causing virus through a visual game (Khatib et al. 2011). In the library and museum space, crowdsourcing has enhanced the collection of metadata, such as with the New York Public Library's "What's on the Menu?" project (New York Public Library 2011), and the Library of Congress's Flickr pilot (Library of Congress 2008). For a decade, games have been seen as a useful way to encourage participation in crowdsourcing efforts: see Google's Image Labeler game (Google 2006) and the Finnish government's translation program, *DigiTalkoot* National Library of Finland and Microtask 2011).

Crowdsourcing games benefit libraries and archives in two ways. First, computer games have the potential to attract audiences who might never interact with an archive. Second, crowdsourcing participants can create much more metadata than typical staff could do alone in the same timeframe. MG allows the public, who might not otherwise interact with library collections or archives, to explore humanities content while contributing to vital records. Furthermore, initial work suggests that data contributed through MG is particularly useful for allowing the public to browse and search archives, and area where data provided by library staff sometimes falls short (see Manzo et al. "'By the People, For the People': Assessing the Value of Crowdsourced, User-Generated Metadata," *Digital Humanities Quarterly,* 9(1), 2015). Thus, MG has the potential to unearth new knowledge that could radically enhance scholarship in the humanities, expanding what records we can encounter in our quest to understand the human experience.

In the course of this project, we created and tested over 10 front end games/applications for browser and mobile platforms: Games with the names *Zen Tag, NexTag, Guess What!, One Up, Pyramid Tag, Stupid Robot, Ships Tag, Book Tag, Portrait Tag, r-kive, Crowded Dungeon, Sort It!*, and more. We conducted 5 research studies investigating data quality and player motivation to contribute to crowdsourcing, including ways to frame crowdsourcing tasks, and gameplay factors' (such as timing and feedback) effects on player motivation. Partnerships and collaborations with institutions such as the British Library, the National Archives, and the University of Edinburgh resulted in the creation of a mobile non-game crowdsourcing tool (*r-kive*), and with the Biodiversity Heritage Library, two additional crowdsourcing games *Smorball* and *Beanstalk*, with additional support from IMLS. The formation of the

[CrowdConsortium](#), a broad mix of libraries, archives, museums and other cultural heritage organizations all over the world engaged in exploring the potential for crowdsourcing for enhancing research, collections and other aspects of their institutions, was also triggered by the project and received additional support by Alfred P. Sloan and IMLS.

METADATA GAMES Project Highlights

+ At the end of our funding, Metadata Games served:

45 Collections, 11 Institutions
16,700+ Media items (images, audio, video)
50,200+ distinct tags, 315,000+ total tags
269 - highest number of distinct tags for a media item
390+ registered users
+ We forged partnerships with the Holocaust Museum, the British Library, the National Archives, University of Edinburgh, and many more prominent institutions and collections;
+ We created and tested 10 front end games for browser and mobile, including those that carry video, utilizing Zen Tag, NexTag, Guess What!, One Up, Pyramid Tag, Stupid Robot, Ships Tag*, Book Tag*, Portrait Tag*, r-kive, Crowded Dungeon, Sort It!, and more
+ We conducted 5 research studies looking at data quality and motivation to contribute to crowdsourcing, including ways to frame crowdsourcing tasks, as altruistic or not, and motivation dependent on timing and feedback in games.
+ We conducted a massive technical server load test on the Amazon cloud, co-sponsored with Dartmouth College's Neukom Institute;

+ In partnership with the National Archives, we created "r-kive," a non-game crowdsourcing tool that makes it easy for people to describe and search their own images on their phones. Occasionally, in between tagging their own images, users are asked to tag an image from the United States' National Archives. These tags are sent back to the National Archives database in order to make those images searchable by the public and further enhance the National Archives database. The Code

The Metadata Games Code

Metadata Games is a Free and Open Source Software (FOSS), crowdsourcing gaming platform that consists of two web applications, a "Content" (mg-content) and "Game" (mg-game) app. Both are written in php, javascript, and html5. Both web applications are designed to be installed on a LAMP (Linux, apache, mysql, php) stack web server typically used at most web hosting services. The Metadata Games Game App includes a prototype NLP framework (a bootstrapped python server) for filtering tag submissions during gameplay and afterwards. The Metadata Games platform is designed such that multiple Content Apps connect to a central Game App.

https://github.com/tiltfactor/mg-game
The Game App stores and manages the games, registered player profiles, and submitted tags. The Game App also includes a basic, publicly accessible Search page for finding and viewing media supplied by participating Institutions (via their Content App). On the Search page, one can do keyword search for media and filter by institution, collection, or media type. The code for the games resides on the Metadata Games Game App. For each game, the Game App handles what media to pull from the Content Apps for gameplay and game data, such as game states (e.g., information about whose turn it is, which round the game is currently in, etc.) and tags submitted by players.

https://github.com/tiltfactor/mg-content
This is the second application, the Content App, is what Institutions install onto their servers to store and handle any media they want to use with a Metadata Games install. This includes importing media (images, audio, and video), as well as defining and editing media collections, collection licensing terms, and institution descriptions. Thus, institutions, via their Content App, have full control over the media they choose to release for tagging by players of the Metadata Games suite.

Challenges and Recommended Best Practices

Aligning User Incentives with Submission of High Quality Metadata

While avoiding inaccurate data, or 'spamming,' is often discussed as a central concern in the context of crowdsourcing projects, promoting the submission of particularly high quality data is a challenge of at least equal difficulty and is often overlooked. In MG, high quality data take the form of tags that are both accurate and specific. The problem with gathering these data is that to a crowdsourcing system, highly specific data and inaccurate data look very similar: both have low frequency entries in the database. To solve the challenge of specific data looking like inaccurate data, our team developed and tested what we call the "Outlier Design Model," and created a game to leverage it. In the Outlier Design model, the goal is to disincentivize the entry of a range of obvious tags without forbidding them. Players

may enter obvious tags if they aren't capable of discerning more specific details from an image, but commonplace tags can only go so far in succeeding in a game's reward structure.

In short, the game *One-Up* uses the Outlier Design Model by rewarding players with extra points for inputting tags that match past players of the game, but deducting points for inputting tags that match their current individual opponent. In *One-Up*, highly specific tags are a player's best strategy, because it is far more likely that one of many past players shares the same specific knowledge with the current player than her opponent shares specific knowledge with the current player. (See: Flanagan, M., Punjasthitkul, S., Seidman, M., Kaufman, G. and Carini, P. "Citizen Archivists at Play: Game Design for Gathering Metadata for Cultural Heritage Institutions," *Proceedings of DiGRA 2013*, Atlanta, Georgia, August 2013).

Providing Player Feedback on Problems with Unknown Solutions

A key challenge in designing crowdsourcing games is how software and game creators can reward players for solving a crowdsourcing microtask when the answer is not known? How can game creators avoid rewarding players for incorrectly solving a crowdsourcing microtask? For transcription, we utilized machine learning techniques (Optical Character Recognition (OCR) algorithms) to do a "first-pass" on transcription, then use metadata game as a verification task (e.g., following a "ReCAPTCHA" software-style model); user playtests showed this approach created a more enjoyable, more accessible game experience.

Free Text Entry vs. Constrained Text Entry

"Free text entry"—that is, and open box in which the user may type tags, sentences, and so on (a technique used in some of our games, such Zen Tag)—can be an effective interface option for those who need to collect many user tags, but the more open the entry system, the less enjoyable the interface tends to be when positioned as a game. To address this design challenge, we tailored specific games towards different target audiences. Stupid Robot, One-Up, Pyramid Tag, and the BHL games have a more game-like experience for game motivated players, using constrained text entry. NextTag, Zen Tag, Book Tag, and Ships Tag allow for free text entry to collect lots of user tags, and these are particular suitable for players motivated by altruistic relationships to the content or host institution.

Effects of Timers and Inaccurate Feedback on Game Experience

Game elements such as timers and points (feedback) can make crowdsourcing microtasks more compelling. How important are these elements to compelling gameplay, and do they impact data quality? In a game study we conducted, we found that game feedback is crucial for a good game experience, but such feedback doesn't have to be accurate (See: Freedman, G., Punjasthitkul, S., Seidman, M., & Flanagan, M. (2016). "Feedback and Timing in a Crowdsourcing Game." *CoRR*, *abs/1609.02182*. Retrieved from http://arxiv.org/abs/1609.02182).

Designing apps and games for both mobile and desktop where the main user input is text-based (i.e., typing input) can be challenging because onscreen keyboards on phones and tablets can take up much of the screen real estate, a different challenge than it would be in a desktop computer experience. In addition, typing itself can be a fun activity for users with physical keyboards that results in fast and accurate tagging, while typing on mobile devices is often frustrating, slow, and rife with errors.

Since we found no 'magic' solution to designing one app that can easily be used on both mobile devices and desktops, when making games for both platforms, we optimized each game separately for its target device.

To tackle the awkward task of typing on mobile devices, we investigated non-typing solutions: ways to allow users to choose words or phrases using the on-screen keyboard. Our app *r-kive*, for example, utilizes this design feature, allowing users to type new tags for their images when necessary, but allowing them to choose and apply a past tag they have typed with a single tap, thus often obviating the need for the onscreen keyboard for long stretches of gameplay.

Value of User Input

Metadata Games collects tags and text descriptions generated by untrained members of the public. These texts are termed in the field as creating "folksonomies," or common ways of describing and categorizing. While the value of folksonomies for libraries and archives is still being investigated, few institutions (excepting our collaborators at the University of Edinburgh and the National Archives) currently use folksonomies in meaningful ways. Thus, encouraging institutions to adopt folksonomies will continue to be a shared challenge for crowdsourcing projects.

In order to address this problem, team member Christina Manzo led a study where participants were first tasked with finding a set of images using a search index containing either (1) a combination of folksonomic and controlled vocabulary metadata or (2) only controlled vocabulary metadata. Analysis revealed that participants in the folksonomic and controlled vocabulary search condition were, on average, six times faster to search for each image compared to participants searching with access only to controlled vocabulary metadata, and 'folksonomic' users successfully retrieved significantly more items overall. Following this search task, all participants were asked to provide descriptive metadata for nine digital objects by playing three separate single-player tagging games. Analysis showed that 88% of participant-provided tags were accurate, and that both tagging patterns and accuracy levels did not significantly differ between groups of professional librarians and participants outside of the Library Science field (Manzo 2015). These findings illustrate the value of folksonomies for enhancing item "findability," or the ease with which a patron can access materials, and the ability of librarians and general users alike to contribute valid, meaningful metadata. This could significantly impact the way libraries and other cultural heritage organizations conceptualize the tasks of searching and classification.

The results suggest that folksonomies have the potential to drastically enhance item "findability," or the ease with which a patron can access archive materials, and thus the ability of librarians and general users alike to contribute valid, meaningful metadata (Manzo et al. 2015).

Institutional Barriers to Implementation

Metadata Games is a powerful system, but adoption has been a key challenge among institutions, even with national informative events such as the NEH-sponsored "Engaging the Public" cross-division government, academic, and NGO workshop in 2015. That project in fact conducted many surveys across professions and institutions within the museum and library science field, and found that a large majority were interested in using Metadata Games, but there were a number of institutional barriers they had to face in committing to crowdsourcing projects, even with a the low barrier of entry that Metadata Games currently offers. Many interested staff members across institutions were not allowed to install the software, for example.

Stand Alone Metadata Creation?

As we approached the conclusion of the Metadata Games project, our team wanted design a hyper-lightweight solution to this perceived barrier to using crowdsourcing. We asked, "What if there was no need for any type of software installation to set up the public to contribute to institutional archives?" In partnership with the National Archives, we created "*r-kive*," a non-game crowdsourcing mobile app that makes it easy for people to search their own photos on their phones.

r-kive is a photo-tagging app for iOS and Android mobile devices with a built-in photo browser. The app allows the user to quickly and easily apply tags to photos they have taken on their phone, allowing textual tag input as well as quick one-tap selection of previously used tags. Interspersed among the user's images, the user is occasionally asked to tag an image from the National Archives, accessed via an API, and the tags the player chooses are sent back to NARA to further enhance their database.

Outreach Efforts

Technology creators, especially those in academia, tend to assume that when they create a product, if that product is good users will gravitate to it automatically. In reality, no matter the quality of the product, reaching out to and recruiting new users is *always* a challenge.

We ran "tag-a-thons" in collaboration with the British Library, the Sterling and Francine Clark Art Institute Library, United States Holocaust Memorial Museum, Dartmouth College, the American Antiquarian Society, and Boston Public Library. We also offered demos and had game kiosks available at various events and other institutions, such as DPLA Fest and the University of Buffalo. While these events were successful, crowdsourcing projects also need institutional commitment and backing to be most effective. Outreach is a far greater portion of the work in such a project than initially planned for by most teams and likely for most digital humanities projects.

The use of Metadata Games as a system to install at a particular institution was also an outreach challenge. Our team built a robust system and involved many advisors and institutions in its design. In the end however, the system did not find many sites for installation. Most institutions wanted our team to act as a metadata 'service' and store and manage their materials for them. This was not the research goal and our team does not have the infrastructure to act as a national service for other institutions, but there is need in this domain.

Technical Framework

Technological landscapes are constantly in flux, and this is no different within the digital humanities. New technologies are always promising, but products made with these new technologies can suffer from older institutions' lack of ability to use them. Meanwhile, products built on older technologies can be more readily usable by institutions, but may become outdated more quickly. Major updates brings new features and faster performance, but can also break backwards compatibility, requiring substantial code rewrite**.**

The Future

Improving adoption of crowdsourcing projects–and improving access to humanities artifacts–at cultural heritage institutions requires attention to data workflow/processes.

Repository/Collection API development

An Application Programming Interface (API) is a set of requirements that dictates how one application can talk to another. By developing and making accessible an API to the collection database, developers will have opportunities to create novel applications that increase user engagement with collections. From an institutional viewpoint, there is no additional software installed, as information requested is accessed using the API. API access gives developers and content providers freedom to display requested information as they would like it organized.

Prototype and iterate data workflows

Currently, crowdsourced data workflows are incomplete–while there are a number of crowdsourced projects, few, if any, cultural heritage institutions have figured out how to utilize these user submitted tags and descriptions. Further research is needed in prototyping and studying how user submitted data augments finding institutional collection artifacts. Our unexpected international partner, the University of Edinburgh's Library Labs, have imported users' tags back into their image repositories and collection sites. The US National Archives displays user tags for a particular artifact using *r-kive* as soon as they are submitted (although it remains unclear as to how the National Archives search algorithms will incorporate user tag data).

Use an "embedding" approach, similar to product placement technique used in film. I.e., perform crowdsourcing task while focused on other objectives (e.g., game's goals). This also has design implications for non-game crowdsourcing applications as well (e.g., **r-kive**).

Machine Learning techniques

As machine-learning techniques are improving, crowdsourcing games and applications may move from input-focused to output-verification, particularly for transcription tasks.

Additional Support

Additional support of the project goals were found through an Alfred P. Sloan and Institute of Museum and Library Services (IMLS) grants with the Biodiversity Heritage Library (BHL) and Maryland Institute for Technology in the Humanities. The Neukom Institute at Dartmouth College supported our experiments with cloud based hosting and Amazon web services.

References

Flanagan, M. and Carini, P. "How games can help us access and understand cultural artifacts," *American Archivist* vol. 75, no. 2 (December 2012), pp. 514-537.

Flanagan, M., Punjasthitkul, S., Seidman, M., Kaufman, G. and Carini, P. "Citizen Archivists at Play: Game Design for Gathering Metadata for Cultural Heritage Institutions." Proceedings of DiGRA 2013, Atlanta, Georgia, August 2013.

Freedman, G., Punjasthitkul, S., Seidman, M., & Flanagan, M. (2016). "Feedback and Timing in a Crowdsourcing Game." *CoRR*, *abs/1609.02182*. Retrieved from http://arxiv.org/abs/1609.02182).

Google (2006) Google Image Labeler [Online Web Game] Google, Mountain View, CA USA.

Khatib, F., Dimaio, F., Cooper, S., Kazmierczyk, M., Gilski, M., Krzywda, S., Zabranska, H., Pichova, I., et al. "Crystal structure of a monomeric retroviral protease solved by protein folding game players," in Nature Structural & Molecular Biology vol. 18, no. 10 (September 2011), pp. 1175-1177.

Library of Congress (2008) Flickr pilot project. [Online Web Browser Project] Library of Congress, Washington DC, USA.

Manzo, C., Kaufman, G., Punjasthitkul, S., & Flanagan, M. "'By the People, For the People': Assessing the Value of Crowdsourced, User-Generated Metadata," *Digital Humanities Quarterly,* 9(1), 2015

National Library of Finland and Microtask (2011) DigiTalkoot [Online Web Browser Game] National Library of Finland, Helsinki, Finland.

New York Public Library (2011) What's on the Menu [Online Web Browser Application] New York Public Library, New York, NY USA.

Appendix 1: Introduction to the Technical Approach

Metadata Games is a Free and Open Source Software (FOSS), crowdsourcing gaming platform that consists of two web applications, a "Content" (mg-content) and "Game" (mg-game) app. Both are written in php, javascript, and html5. Both web applications are designed to be installed on a LAMP (linux, apache, mysql, php) stack web server typically used at most web hosting services. The Metadata Games Game App includes a prototype NLP framework (a bootstrapped python server) for filtering tag submissions during gameplay and afterwards. The Metadata Games platform is designed such that multiple Content Apps connect to a central Game App.
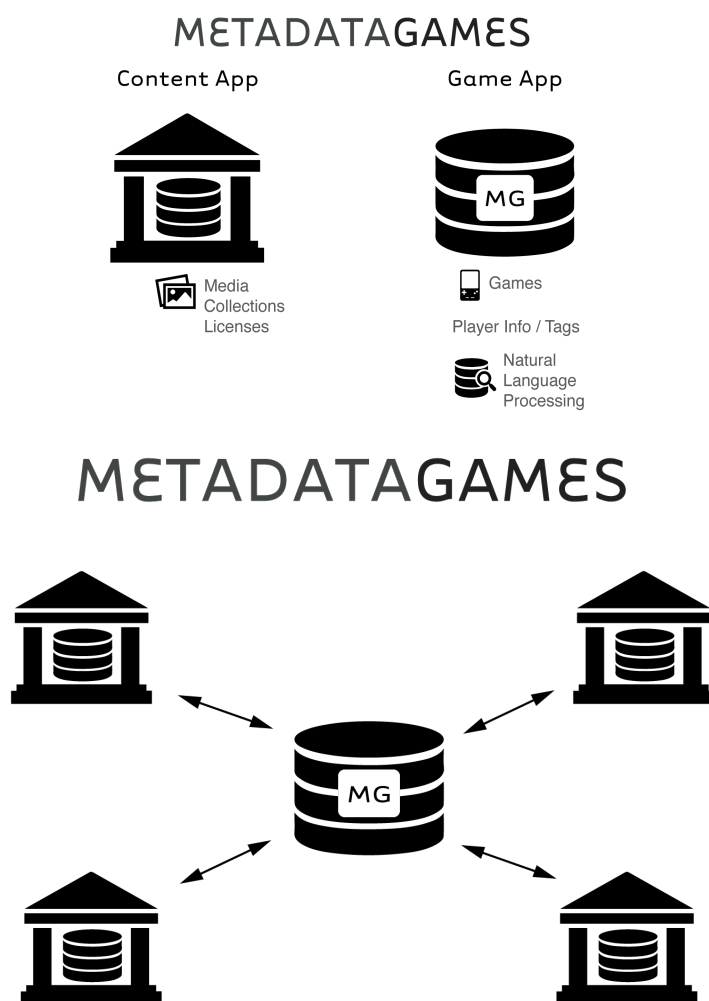
Appendix 2: Game App Overview (mg-game)

The Game App stores and manages the games, registered player profiles, and submitted tags. The Game App also includes a basic, publicly accessible Search page for finding and viewing media supplied by participating Institutions (via their Content App). On the Search page, one can do keyword search for media and filter by institution, collection, or media type. The code for the games resides on the Metadata Games Game App. For each game, the Game App handles what media to pull from the Content Apps for gameplay and game data, such as game states (e.g., information about whose turn it is, which round the game is currently in, etc.) and tags submitted by players. The source code and documentation for the Game App can be downloaded at https://github.com/tiltfactor/mg-game.

Media & Tags

Media
Manage media that have been imported and processed.

Tags
Manage tags that have been created by players.

Collections
Group media and apply applicable licences.

Licences
Create licences under which media can be published in the system.

Export
Export tags, tag uses, and tagged media.

Players

Players
Manage registered players and the tags they have created.

Subject Matters
Manage subject matter categories in which players can express interest. These values are used to influence media selection and tag weights.

Games & Plugins

Plugins
Plugins allow the flexible extension of functionality and can be managed here.

Games
Manage games.

Badges
Manage badges that can be achieved by players.

Other

IP Blacklist
Restrict access to Metadata Games by whitelisting or blacklisting IP addresses.

Global Settings
Configure settings that are used globally in the system.

Admin Log
Access records of changes made using admin tools.

Update DB
Please visit this tool after an update of the code base to make sure the database structure is up-to date.

Institution
Manage MG Content Server register to MG Game Server

METADATAGAMES BETA

Search | Arcade | Contact | **Admin** | Profile | Logout (gameadmin)

Arcade » Admin » Tags

Manage Tags

You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.

Advanced Search

Displaying 1-24 of 24 results.

	Tag	Tag Info	Top Media	Top Users	Created	Modified	
	basketball						
	basketball	Used **33** time(s) on **29** media(s). Weight: AVG(1.0303), MIN(1), MAX(2)	x 2 x 2 x 2 x 2 x 1	aqua(1), Laura(1), Lyra(1)	2014-01-16 18:52:05	2014-01-16 18:52:05	
	basketball players	Used **3** time(s) on **3** media(s). Weight: AVG(1.0000), MIN(1), MAX(1)	x 1 x 1 x 1	Lyra(1)	2014-01-22 13:28:41	2014-01-22 13:28:41	
	kneeling caucasian basketball player	Used **1** time(s) on **1** media(s). Weight: AVG(1.0000), MIN(1), MAX(1)	x 1	Laura(1)	2014-01-22 14:06:27	2014-01-22 14:06:27	
	holding basketball	Used **2** time(s) on **2** media(s). Weight: AVG(1.0000), MIN(1), MAX(1)	x 1 x 1	Laura(2)	2014-01-22 14:06:27	2014-01-22 14:06:27	
	basketball court	Used **2** time(s) on **2** media(s). Weight: AVG(1.0000), MIN(1), MAX(1)	x 1 x 1	Laura(1)	2014-01-22 14:06:27	2014-01-22 14:06:27	
	dartmouth basketball player running with basketball	Used **1** time(s) on **1** media(s). Weight: AVG(1.0000), MIN(1), MAX(1)	x 1	Laura(1)	2014-01-22 14:07:51	2014-01-22 14:07:51	
	dartmouth basketball player dribbling ball down court as two opp	Used **1** time(s) on **1** media(s). Weight: AVG(1.0000), MIN(1), MAX(1)	x 1	Laura(1)	2014-01-22 14:08:43	2014-01-22 14:08:43	

METADATAGAMES BETA

Search | Arcade | Contact | **Admin** | Profile

Arcade » Admin » Players » delli2

View Player delli2

Player Name	delli2
ID	6
Email	test3@tiltfactor.org
Status	Active
Role	player
Created	2013-10-02 09:44:34
Modified	2013-10-02 09:44:34
Lastvisit	2014-01-21 20:33:53
Banned Tags	0
Number Sessions	100

Actions

Manage Players
Manage Profile Fields
Create Player
Update delli2
View Tag Uses of delli2

Used Tags

TAG (COUNTED/AVG WEIGHT)

Displaying 1-50 of 230 results.
Sort by: Tag name   Use Count

dartmouth (18/1.5556)
students (14/1.7857)   green (8/1)
tennis (7/1.4286)   sunny (6/1)
hopkins center (6/1.6667)
fall (5/1.4000)
undergrads (4/1.7500)
bones (4/2.5000)
college (4/2.0000)   grass (4/1)
skulls (4/2.0000)   orientation (4/1)
anatomy (4/1.7500)
wings (4/1.5000)   antennae (4/1)
studio (3/1.6667)   indoors (3/1)
freshmen (3/1)   art (3/1)
conductor (3/1.6667)   school (3/1)
new hampshire (3/1)   medical (3/1)
meat (2/3.0000)   brown (2/1)

Tagged Media

MEDIA NAME (TIMES TAGGED BY USER/WITH NUMBER OF DIFFERENT TAGS)

Displaying 1-25 of 34 results.
Sort by: Media name   Tagged Count

2003-0912021648.jpg (1/1)

2010-1515390170.jpg (1/1)

ants-on-cereal_w725_h544.jpg (1/1)

174.png (4/4)

beer-optimator-glass-bottle_w725_h544.jpg (2/2)

2009-0326290055.jpg (12/11)

grasshopper-in-hand_w725_h544.jpg (21/12)

d112762d756a69fd509042e176c761b9e31ad792b8e079010d15047986a681cf.jpg (9/9)

Processing Export

63 media, 33 processed, 30 left

Please do not leave the page or close the browser's tab, or window.

sample_20140125_tags   Open with M

# This file contains an export of tag data from an installation of				
# Metadata Games	a metadata tagging system from Tiltfactor Laboratory.			
# For more information	see http://tiltfactor.org/mg/			
#				
# This Export:				
# ------------				
# Version: metadatagames_0.1				
# Plugin: TagsExportPlugin				
# Format: 1.0				
# Date: Sat	25 Jan 2014 23:13:28 -0500			
# System: some.university.edu/mg/ (TODO: Source the correct value here)				
#				
Image Name Tags				
icon1647-0130c-0000002A.jpg basketball game				
icon1647-0130c-0000012A.jpg athlete in the very early 1900s				
icon1647-0130b-0000016A.jpg four dartmouth college basketball players				
icon1647-0150-0000008A.jpg dogs	faternity			
icon1647-0130a-0000007A.jpg basketball player jersey number 4				
icon1647-0130c-0000018A.jpg sports player sitting on a bench looking frustrated				
icon1647-0130b-0000014A.jpg gym class				
icon1647-0130a-0000017A.jpg basketball player	dartmouth	short shorts		
icon1647-0130a-0000022A.jpg basketball player	short shorts			
icon1647-0130c-0000007A.jpg a basket ball	basketball player	two men		
icon1647-0130a-0000001A.jpg darthmouth				
icon1647-0150-0000009A.jpg 1980's	blues brothers	college	costume	dance
icon1647-0130c-0000011A.jpg dartmouth basketball player				
icon1647-0150-0000003A.jpg singing guys				
icon1647-0130c-0000030A.jpg ballgame				
icon1647-0130c-0000013A.jpg dartmouth sports uniform	older man	shirt	sports coat	tie
icon1647-0130c-0000026A.jpg basketball player	basketballer	each kneeling on court while holding a basketball	monochrome	nine individual photos of white dartmouth basketball players
icon1647-0130a-0000028A.jpg basketball player	basketballer	darthmouth	holding basketball overhead preparing to shoot	number 7
icon1647-0130c-0000017A.jpg holding basketball	number 6	preparing to pass or throw the ball	wearing knee braces	white dartmouth basketball player
icon1647-0130c-0000001A.jpg basketball	dartmouth basketball player dribbling ball down court as two opp	large crowd watching from stands	play	run
icon1647-0130c-0000003A.jpg basketball player	basketballer	dartmouth basketball player running with basketball	game	guarded by opposing player in dark uniform
icon1647-0130c-0000023A.jpg basketball court	holding basketball	jersey dartmouth 3	kneeling caucasian basketball player	PASSONTHISTURN
icon1647-0130a-0000024A.jpg basketball	dartmouth college			
icon1647-0130c-0000019A.jpg basketball players	dartmouth college			
icon1647-0130c-0000032A.jpg basketball players	black and white	cancelled out	contact sheet	photos
icon1647-0150-0000012A.jpg blond	broom	chest	dressed	drums
icon1647-0130a-0000010A.jpg basketball	basketball player foto	free	throw	underhanded
icon1647-0150-0000002A.jpg backwards	confused	hat	paneling	pants
icon1647-0150-0000006A.jpg four young men	jackets	jeans	performance	singers
icon1647-0130c-0000015A.jpg short-shorts				
icon1647-0130a-0000015A.jpg 21	african	american	basketball	black

```
{
    "extension": {
        "comments": [
            "This file contains an export of tag data from an installation of ",
            "Metadata Games, a metadata tagging system from Tiltfactor Laboratory.",
            "shortcutFor more information, see http:\/\/metadatagames.org"
        ],
        "version": "0.1",
        "format": "1.0",
        "data": "Sun, 13 Apr 2014 16:59:07 -0400",
        "system": "Metadata Games",
        "media": {
            "06_10_012919.jpg": {
                "institution": "Boston Public Library",
                "collection": [
                    "Tichnor Postcard Collection"
                ],
                "tags": [
                    "greeting from arizona postcard"
                ]
            },
            "06_10_019805.jpg": {
                "institution": "Boston Public Library",
                "collection": [
                    "Tichnor Postcard Collection"
                ],
                "tags": [
                    "1885",
                    "919 congress ave",
                    "austin",
                    "austin texas",
                    "candies",
                    "candy",
                    "candy store",
                    "confectioner",
                    "home of texas chewie pecan pralines",
                    "lamme's candies",
                    "linen look",
                    "pecan",
                    "postcard",
                    "pralines",
                    "since 1885",
                    "sweets",
                    "texas",
                    "texas chewie pecan pralines"
                ]
            },
            "06_10_015254.jpg": {
```

List of Games

The Game App includes a number of games that cater to a variety of player interests. Some games are designed to be time based and competitive; others are more open ended, playful "portals" for input.

Zen Tag. A casual single-player browser game, Zen Tag utilizes a clean, minimalist design to present players with an image. Players are invited to describe the image with individual words or phrases, separated by commas. After tagging a series of four images, players are awarded points for the number of tags they submitted. In addition to handling the games themselves, the Game App manages tags submitted, including exporting tag data (either as .csv or in .json using MOD schema), player profiles, and a front-end basic search.

List what is in this media, separated by commas
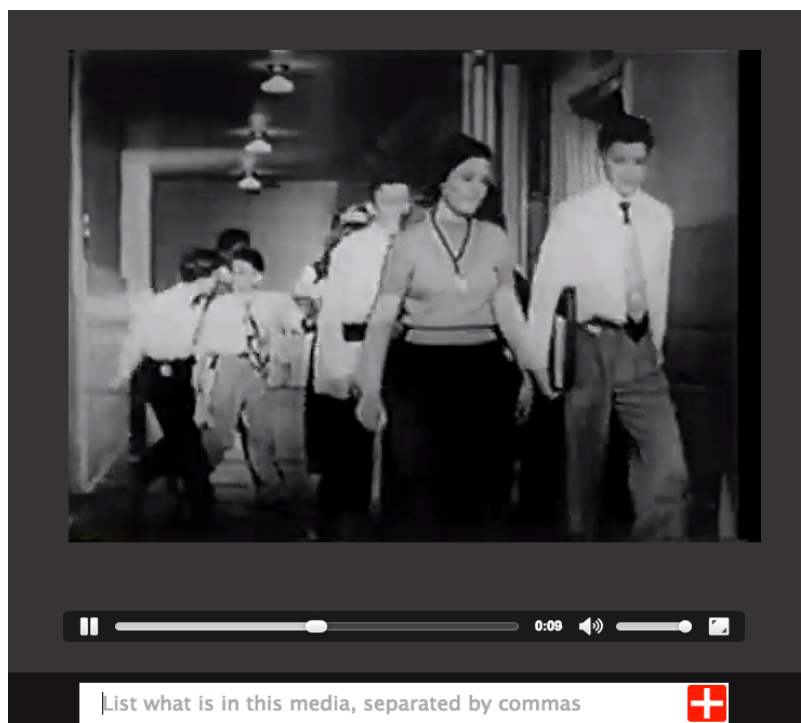
NexTag is a single-player browser game that functions much the same way as Zen Tag but also allows for the presentation of audio and video media, which are presented to players in random twenty-second segments of the full clips to facilitate tagging.
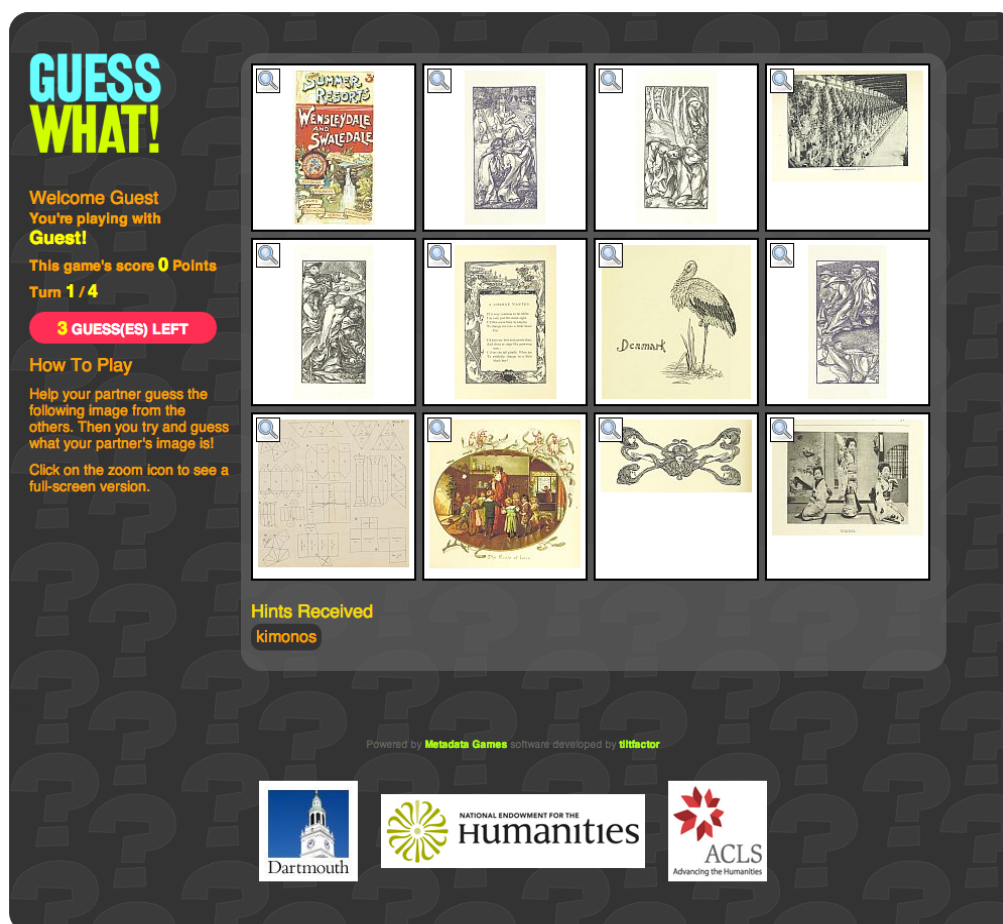
Guess What! is a two-player, real-time cooperative game that puts players in the role of "Hinter" and "Guesser." In the game, the Hinter is shown a single image and must provide a clue to the Guesser in the form of a single tag. The Guesser's screen contains an array of twelve images, from which he/she must correctly identify the Hinter's image, based on the clue given. Points are awarded to both players based on the number of hints required for the Guesser to correctly identify the image. In this way, the Hinter is incentivized to provide accurate and specific tags to the Guesser. The two roles switch after each turn, giving both players a chance to input tag-based hints.
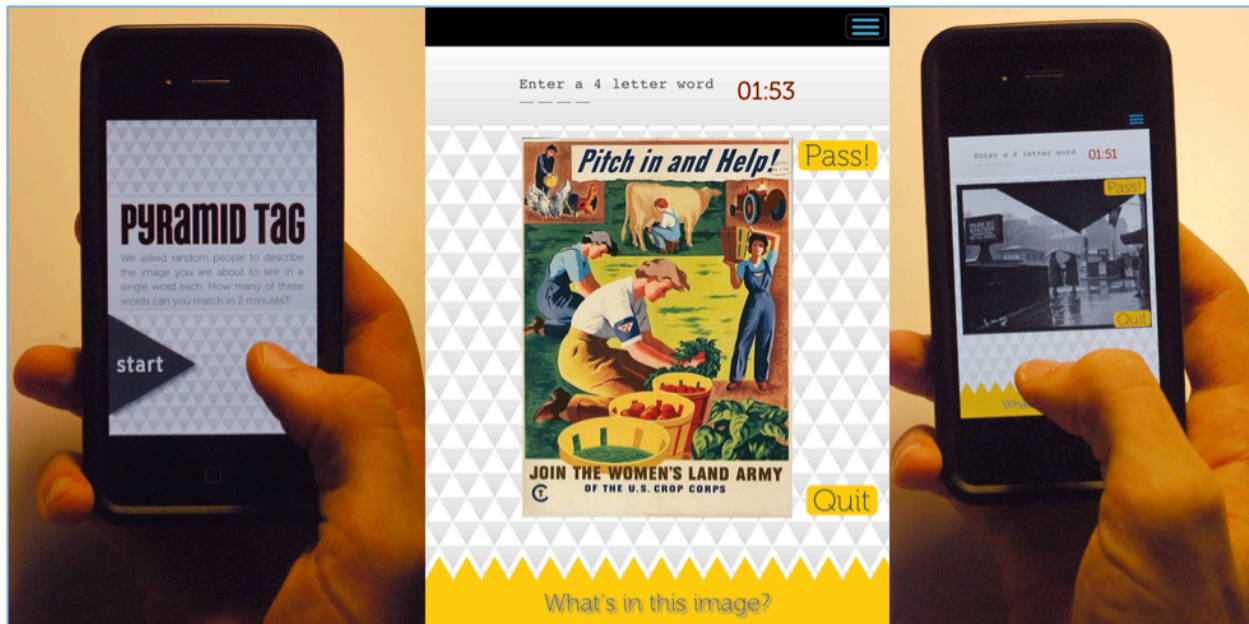
Pyramid Tag is a single-player game for iOS and Android devices that have players race the clock to try to match popular tags for images. In the game, players are shown an image. As the 2-minute timer goes down, players must try to guess what words a group of randomly selected players previously used to tag the same image. The catch is that players may only enter words that match a particular number of letter spaces provided (ranging from four to thirteen) with more points awarded for matching a higher number of words of distinct length.
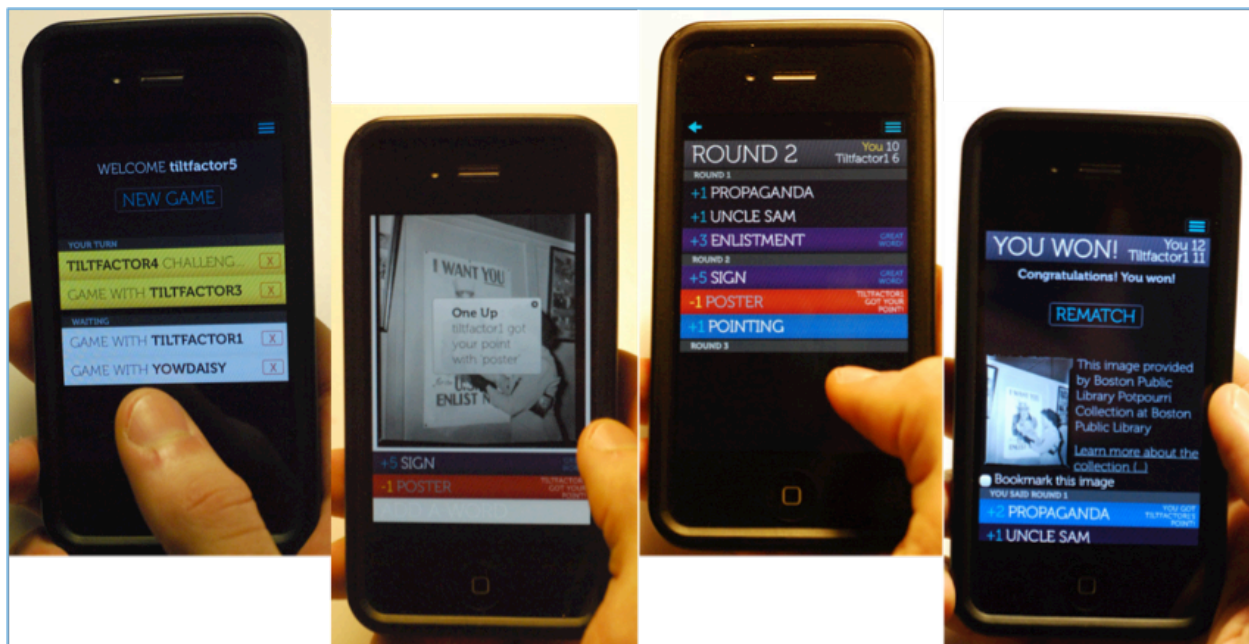
One Up is a competitive, two-player, turn-based game for iOS, Android, and browser. When players begin a game of One-Up, they and their opponent are both given the same image, for which they separately submit tags over a progression of three rounds. In each round, the game rewards accuracy by

giving players a chance to earn bonus points for entering tags that match ones that others players previously submitted (and are already in the Metadata Games tag database). However, if players happen to submit a tag their opponent already entered during a previous round, they have been "one upped" and their opponent steals a point from them. In this way, the game's reward structure is designed to incentivize players to input accurate, but also nuanced and specific tags in order to have the greatest chance of winning and not being one-upped by their opponent. This reward structure, which the creators of the game have dubbed "outlier design" (for its incentivizing of higher levels of nuance in entered tags), has been shown in an initial empirical study to increase the levels of accuracy and specificity in players' tags (Flanagan et al. 2013).
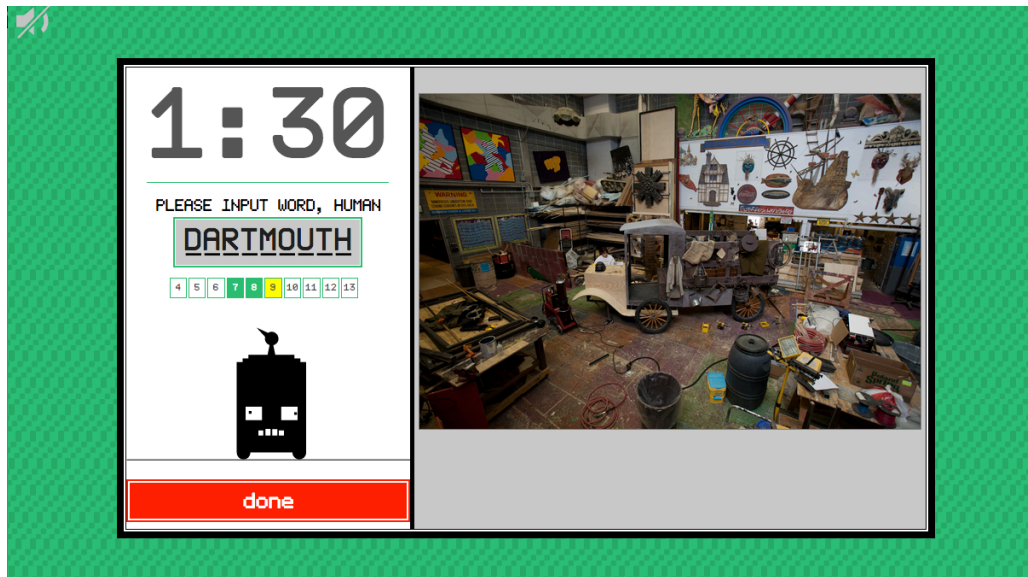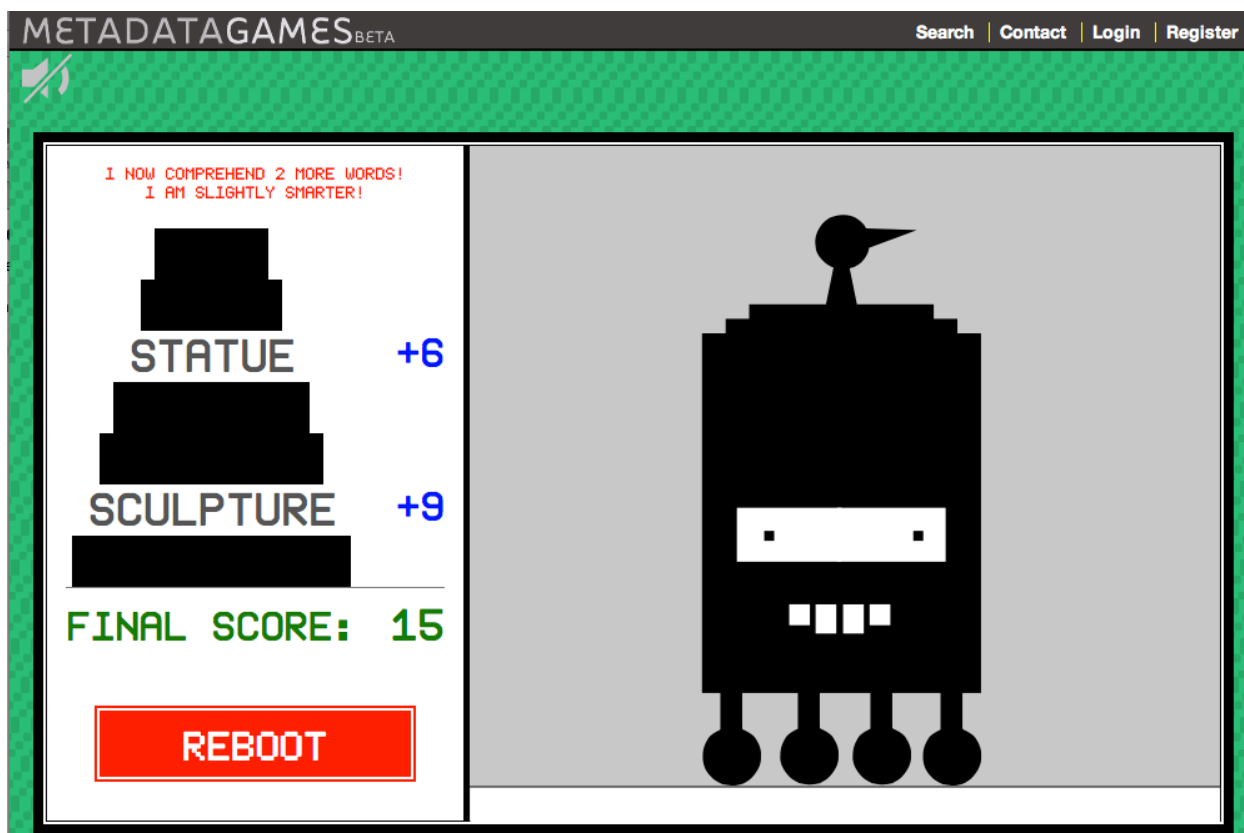
Stupid Robot is a single-player browser game, players are challenged to teach Stupid Robot (who looks at everything but understands nothing) as much as they can about an image from one of our partnering libraries' digital collections. Stupid Robot is built to engage gaming audiences while collecting high quality metadata about the images it's played with. The game uses several metrics to assess the metadata, including dictionary checks (to identify common words), character sequences (to throw out nonsense), agreement with past players, and when all else fails educated guessing.

Games for the British Library

We created collection-specific versions of *Zen Tag* for the British Library to tag public domain image collections the library uploaded to Flickr: Book Tag, Ships Tag, and Portrait Tag. The collaboration between Tiltfactor and the British Library presents an interesting way for the public to engage with the Library's collection of over a million public domain images from within their digitized collection of over 65,000 books from the 17th, 18th and 19th centuries, including intricate maps, geological diagrams, charts, illustrations, landscapes, and more, which were posted onto Flickr Commons in December 2013.
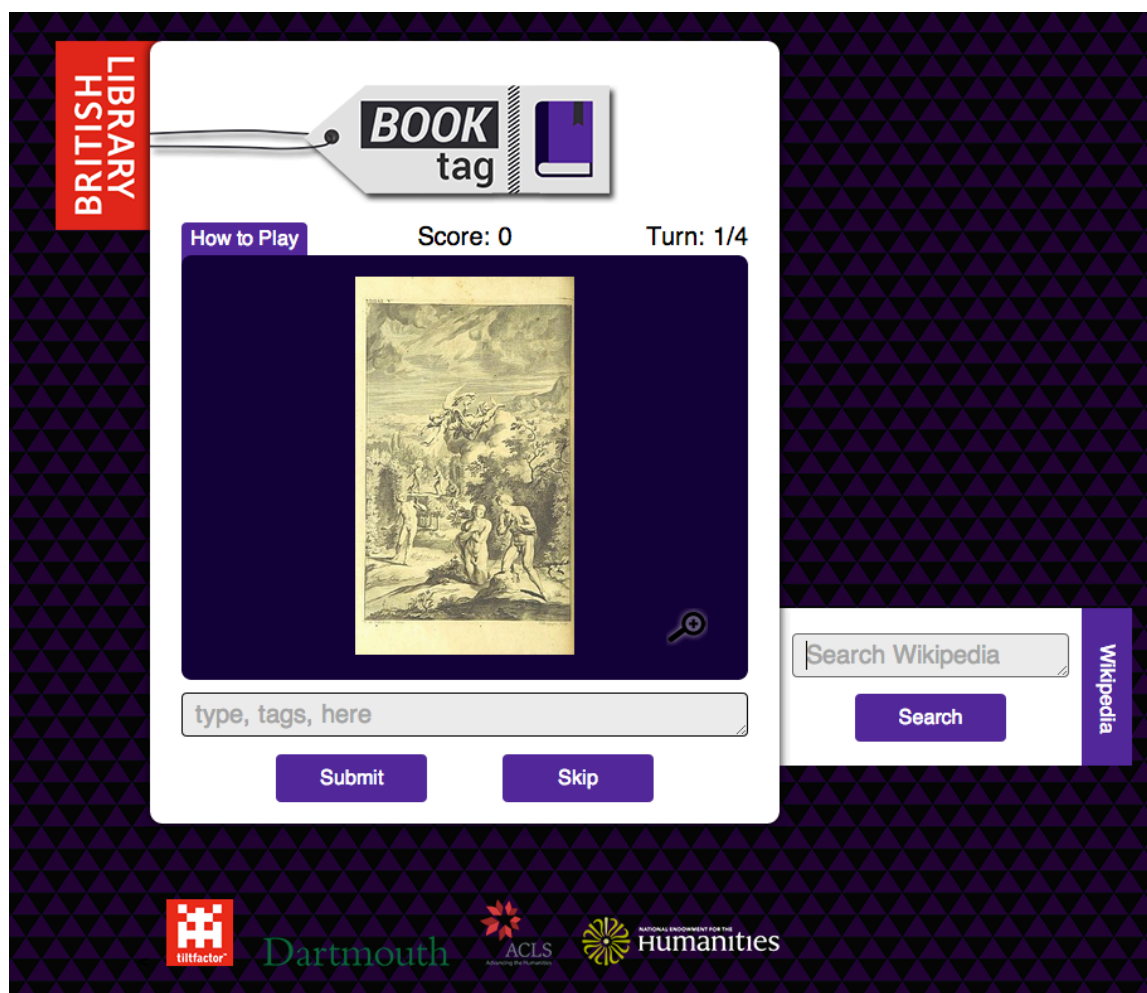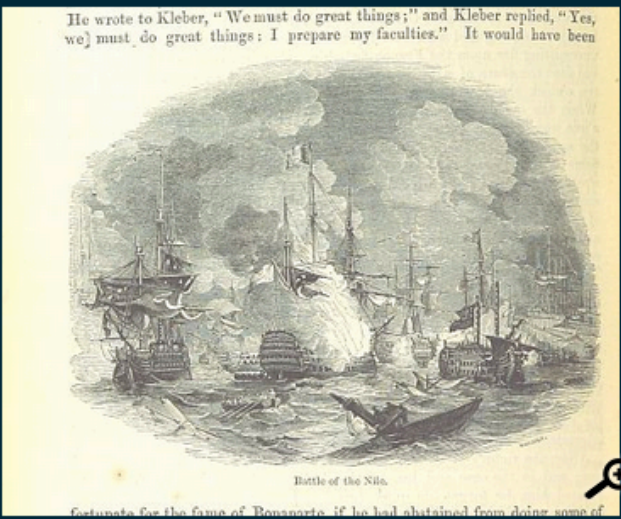
In Ships Tag— players tag naval images; in Book Tag—players tag book covers and title pages; and in Portrait Tag— players tag portraits from books, which helps build the British Library's metadata while also expanding the collection's accessibility for public research, reuse, and repurposing.

The tags generated serve as important metadata, or data embedded with or alongside collections, making the content searchable later, which is something that many recent digitized collections lack.

Appendix 3: Content App Overview (mg-content)

The Metadata Games Content App is what Institutions install onto their servers to store and handle any media they want to use with a Metadata Games install. This includes importing media (images, audio, and video), as well as defining and editing media collections, collection licensing terms, and institution descriptions. Thus, institutions, via their Content App, have full control over the media they choose to release for tagging by players of the Metadata Games suite. The source code and documentation for the Game App can be downloaded at https://github.com/tiltfactor/mg-content.

Home » Admin » Import

Import

Import media using one of the selections below. Then process the images.

Import media from your computer

Select media(s). This includes the ability to click and drag files to import (good for small media sets).

Import media that can be found in the server's '/uploads/ftp' folder

Place media in this folder using a SFTP client and let the system do its work (recommended method for large media sets).

Import media in a ZIP file from your computer

Import .zip compressed archives of media. Currently has a filesize limit of 200 MB.

Transcoding process of imported media

Once you have imported upload audio and video files into the system, here you will see the transcoding progress.

Process imported media

Once you have imported media into the system, use this to process them.

Home » Admin » Import » Transcoding Process of Media

Transcoding Process of Media

You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your filter values to specify how the comparison should be done.

Displaying 1-3 of 3 results.

Action	Executed Started	Parameters	Succeeded	Execution Result
Audio File	2013-10-11 18:42:46	filename: jfk_1961_0427_press_64kb.mp3 chunk: 1 chunkOffset: 20	✔	Done
Audio File	2013-10-11 18:42:41	filename: 1957_Chevrolet.mp3 chunk: 1 chunkOffset: 20	✔	Done
Video File	2013-10-02 06:13:46	filename: Mozilla_2011_Story.webm chunk: 1 chunkOffset: 20	✔	Done

Media | Import | Collections | Licences | Global Settings | Admin Log | Update DB | Server Profile

Home » Admin » Collections

Manage Collections

You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.

Advanced Search

Actions
Create Collection

Displaying 1-1 of 1 result.

	Name	Locked	More Information	Licence	Media	Ip Restrict	
☐							
☐	All	Item locked	This is the default media set. All media will be automatically assigned to it. It cannot be deleted.	Default Licence	0 Media	Not active	🔍 ✏️

Batch Actions ▴▾ Go

Powered by Metadata Games software developed by tiltfactor

mg-game – Installation (THIS TEXT IS DUPLICATED FROM OUR GITHUB PAGE: https://github.com/tiltfactor/mg-game)

(for latest updates on installation, configuration, and other technical documentation, go to https://github.com/tiltfactor/mg-game)

Appendix 4: Installation for Game App (mg-game)

- Requirements
- Grab Game App source code
- Install NodeJS (Skip if not using One Up game)
- Install flask and mod_wgsi (for NLP framework)
- Install Game App
- Running Game App over https

Requirements

LAMP Stack (linux, apache, mysql, php)

We are currently using the following:

- Ubuntu 13.10
- Apache 2.4.6
- PHP 5.5.3
- MySQL 5.5.34

Other things to install

- NodeJS (push notifications for One Up game; currently using 0.10.22)
  - Open port at 8000 (or other higher numbered one)
- For nlpserver
  - Python 2.7.4+
  - Flask (python server) + apache mod_wgsi (for NLP framework)
    - Open port at 8139
- SSL cert (if you decide to use https://)
- Make sure that sendmail is on; this is used for sending registration activation emails to players.

Check PHP Memory Limit

Before installation, have a system administrator configure your server's php.ini file to make sure its PHP memory limit is at least 128 MB. We currently recommend 300 MB or more if you are looking to import and use more than 10,000 images or are importing audio and/or video media.

- Modify php.ini file
  - On Ubuntu, you can find this in /etc/php5/apache2/

- memory_limit - change from 128M to 300M or higher to large image sets, and audio/video media
- post_max_size - change from 8M to 220M to accommodate larger media
- upload_max_filesize - change from 2M to 256M to handle audio and video file uploads
- If running PHP 5.5+
  - Must define date.timezone (e.g., date.timezone # "America/New_York")
  - Make sure you also change this in php.ini in /etc/php5/cli/
  - Reload apache

Grab Game App Source Code

Download the Game App source code

Install NodeJS

We use NodeJS for push notifications in One Up game. Safest way to install is to app from source.

Build From Source

We are currently using v0.10.22

Become root and make a software directory

mkdir -p ~/software/nodejs

cd into that directory.

cd ~/software/nodejs

Grabbing tarball

wget http://nodejs.org/dist/v0.10.22/node-v0.10.22.tar.gz

Unpack it:

tar -zxvf XXXXX.tar.gz

cd into the directory, and read the README.md. That file indicates a standard config/make/make install process.

We'll need gcc installed first. On Ubuntu, this is easy:

apt-get install app-essential

Then build and install:

./configure
make
make install

Most content installs here:

/usr/local/lib/node_modules/{npm}

Configure NodeJS

Open port to 8000

- Make sure port 8000 is open (or whatever port you will use for NodeJS)

Install required packages in package.json

- In mg-game/nodejs/ folder
- Install packages from nodejs/package.json
npm install

- You should now see the folder node_modules/ in nodejs/ folder

Modify settings.js

- modify mgapi URL mgapi : 'http://GAME_APP_LOCATION/www/index.php/api/
- Test URL by entering into web browser window.

○ WORKS - you see text that starts with "MG API" [Link to image metadatagames_gameApp_mg-api_correct.png]

start nodejs

nohup node server.js > nodejs_output.log &

- This runs node server in background and keeps a log file
  - Make sure to rename .log if restarting nodejs for troubleshooting
- Could also more gracefully handle crashes using Forever
  - https://github.com/nodejitsu/forever
  - As of this writing, Forever was missing dependencies to run nodejs 0.10.22
- After starting node server, look in nodejs_output.log
  - If working, you should see "info: socket.io started"

Install flask and mod_wgsi

- Flask and mod_wgsi are used to set up NLP prototype framework
- See README in nlp/ folder for more info
- Make sure port 8139 is open (or whatever port you use for flask)
- Below is a step-by-step way to install on Ubuntu server

Install pip

sudo apt-get install python-pip

Install virtualenv This is used to create virtual python environments to handle possible dependencies conflicts in the future

sudo apt-get install python-virtualenv

Create virtual python environment

- Open project folder in question, then type

virtualenv [name of virtual python environment]

- For example,

virtualenv venv

- Now activate python virtual environment

. venv/bin/activate

Install Flask

pip install flask

You'll need pyenchant for parts of the NLP programs to work

pip install pyenchant

Start flask server

- (from nlp folder)
python run_nlpserver.py

Test flask server

curl http://localhost:8139/possible_wordcheck?input=cromulent

- You should get a response that looks something like this:

```
-------------------------------------------------------------------------
DEBUG in possible_wordcheck [/mg-
game/nlp/nlpserver/scripts/possible_wordcheck/possible_wordcheck.py:81]:
cromulent 0.00372197658456
-------------------------------------------------------------------------

-------------------------------------------------------------------------
INFO in possible_wordcheck [/mg-
game/nlp/nlpserver/scripts/possible_wordcheck/possible_wordcheck.py:89]:
cromulent could be a word.
-------------------------------------------------------------------------
127.0.0.1 - - [24/Dec/2013 13:56:35] "GET /possible_wordcheck?input#cromulent HTTP/1.1" 200 -
```

If using flask with mod_wsgi

Stop flask server

```
ps ux
```

```
kill -9 PID_NUMBER
```

Deactivate flask if going to install with mod_wsgi

```
deactivate
```

(deactivates venv)

Install mod_wsgi

When using mod_wsgi with flask, it is not necessary to start a flask server.

```
sudo apt-get install libapache2-mod-wsgi
```

Copy nlpserver file in nlp/examples/ to /etc/apache2/sites-available folder.

● If on Ubuntu 13.10 which runs Apache 2.4.6+, add .conf extension to filename. Also make sure apache is listening to port 8139 and that it is open in firewall.

Modify nlpserver file to reflect current settings (user, location of files).

Also modify apache2.conf to include path to python virtual environment. For example,

```
WSGIPythonHome GAME_APP_LOCATION/nlp/venv
```

Enable nlpserver.conf and restart apache.

```
a2ensite nlpserver.conf
service apache2 reload
```

TEST: go to http://GAME_APP_URL:8139

● you should see the text, "NLP API: Swagatam"
TEST2: from commandline, test nlp is working.

curl http://localhost:8139/possible_wordcheck?input=cromulent

- If working, you should see something like the following output:

```
{
  "response": true
}
```

Install Game App

In www/protected/data folder, copy fbvsettings_default.php and save it as fbvsettings.php.

In fbvsettings.php, edit the following lines to reflect your current setup:

```
'nodeJSUrl' => 'http://localhost:8000', /* change URL */
'pushUrl' => 'http://localhost:8000/message/', /* change URL */
'nlpApiUrl' => 'https://localhost:8139', /* change URL */
```

If you use Facebook for login, make sure you also edit the following in fbvsettings.php:

```
'facebookId' => 'GET FROM YOUR FACEBOOK DEVELOPER ACCOUNT',
'facebookSecret' => 'GET FROM YOUR FACEBOOK DEVELOPER ACCOUNT',
```

In mg-game folder, go to tools and run fix-perms script.

```
cd tools
./fix-perms.sh
```

fix-perms.sh changes group ownership to www-data, which in Ubuntu systems allow the web server access

The following folders and files need www-data group ownership:

```
assets/
uploads/
protected/runtime/
protected/config/main.php
```

protected/data/fbvsettings.php

Go to web browser and open URL that you have pointed towards your Game App.

http://GAME_App_LOCATION/www/

Click "Proceed with system requirement test" to run a test of server capabilities. This will ensure that your server can support the required Yii framework.

NOTE: Particular directories and files will need to be writable by the webserver user. On Debian/Ubuntu systems, this user is usually 'www-data' while RedHat and derivatives often use 'apache'. The *fix-perms.sh* script located in the tools/ directory may be of help. Please read the code carefully before use!

If your server passes the system requirement test, you may then click "Proceed with database installation", bring you to the Database Setup page.

Database Setup

You will need to fill out the Database Name, Database User Name, and Database Host Name fields for the database you wish to use. If the database has a password, enter this in the Database Password field as well. If you do not have this information, please contact your system administrator. Leave the Database Host Port field blank. If you have not already created a database for use with Metadata Games, please do so now.

After entering the required information, click "Submit".

Admin Account Setup

At the "Admin Account Setup" page, fill out the following fields:

- Application Name - The name for your install of Metadata Games.
- Administrator/User Name - The name of the administrator's account.
- Password - A password for the administrator's account.
- Verify Password - Enter the same password, for confirmation.
- Email - A valid email address for the administrator.

Metadata Games - Admin Account Setup

*Fields with * are required.*

Application Name *
```
Metadata Games
```

Administator/Player Name *
```

```

Password *
```

```
Minimal password length 4 symbols.

**Verify Password** *
```

```

**Email** *
```

```

[ Save ]

Then click "Save". Congratulations! You have successfully installed the Game App for Metadata Games! Now to install the Content App and then configure the games!

# Metadata Games - Further Steps

**Success! The database has been set up and Metadata Games has been installed.**

Now to configure your install of Metadata Games:

**All links below will open in a new tab or window to allow you to return to this list.**

1. Login to gain access to the admin tool.
2. Visit the plugin tool.
3. Visit the games tool and activate the ones you want to use.
4. Visit the Institution page to activate Institutions' Content Builds
5. Go to the Arcade and play!

**Running Game App over https**

If running over https, the following files need to be modified

- nodejs/server.js
- nodejs/settings.js
- www/protected/data/fbvsettings.php
- mg.game.oneup.main.js in /protected/modules/games/assets/oneup/js/

**nodejs/server.js**

- uncomment section to run nodejs over https
- add key.pem and cert.pem
  - More info on creating .pem files: http://www.digicert.com/ssl-support/pem-ssl-creation.htm
  - Make sure access to these files are read-only by owner (eg, 400)

**nodejs/settings.js**

- Make sure mgapi URL is https://

**fbvsettings.php**

- Make sure nodeJSUrl and pushUrl are https://

**mg.game.oneup.main.js**

- Uncomment line with 'io.connect' so that :secure option is enabled.

**Appendix 5:  Game App Configuration**

(THIS TEXT IS DUPLICATED FROM OUR GITHUB PAGE:  https://github.com/tiltfactor/mg-game)

Once the MG Game App and a Content App are installed, it's time to configure your system:

1. Login to gain access to the admin tool.
2. Visit the plugin tool.
3. Visit the games tool and activate the ones you want to use.
4. Activate Institutions' Content Apps
5. Go to the Arcade and play!

# Metadata Games - Further Steps

**Success! The database has been set up and Metadata Games has been installed.**

Now to configure your install of Metadata Games:

**All links below will open in a new tab or window to allow you to return to this list.**

1. Login to gain access to the admin tool.
2. Visit the plugin tool.
3. Visit the games tool and activate the ones you want to use.
4. Visit the Institution page to activate Institutions' Content Builds
5. Go to the Arcade and play!

**1. Login**

Gain access to the Game App by signing in with your newly-created account at the login screen.

http://GAME_APP_URL/www/index.php/user/login

# Login

Please fill out the following form with your login credentials:

*Fields with * are required.*

**username or email** *

**password** *

Lost Password?

☐ Remember me next time

Login

You can access the "Admin Overview" page by clicking on "Admin" in the Metadata Games navigation bar at the top of the page. This page contains links to all of the available tools. These links also appear in the Admin navigation bar, underneath the Metadata Games navigation bar.



NOTE: For detailed information about all admin tools, see the Site Administration guide in the Metadata Games documentation/ folder.

## 2. Visit the Plugin Tool

From the Admin Overview, click Plugins to register and configure plugins settings.

For more information on plugins options, see the Plugin Default Settings help guide in the Metadata Games documentation/ folder.

**3.Activate & Configure Games**

Use the "Games" tool to activate and customize the games you want to use.

- Select game to update by clicking on update icon
- Change status to Active
- Check all of the collections to use in game
- Select plugin(s) to use with game (see below for list of plugins to use for each game)
- Leave other settings as they are.

**Default plugins to use**

- Zen Tag - dictionary-StopWordPlugin, weighting-ScoreNewMatchPlugin
- Nextag - dictionary-StopWordPlugin, weighting-ScoreNewMatchPlugin
- Guess What! - dictionary-StopWordPlugin, weighting-GuessWhatScoringPlugin
- One Up - dictionary-StopWordPlugin
- Pyramid Tag - dictionary-StopWordPlugin

# View Zen Tag

| | |
|---|---|
| **Active** | Active |
| **Number Played** | 37 |
| **Name** | Zen Tag |
| **Description** | Clear your mind and you will hear the voice of the serene tagger within you. Ohm. |
| **Game Media Location** | zentag_arcade.png |
| **Play Once and Move On** | No |
| **Play Once/Move On Forward to URL** | |
| **Turns** | 4 |
| **Maximum Media Width** | 450 |
| **Maximum Media Height** | 450 |
| **Played Games (started)** | 37 |
| **Played Games (finished)** | 24 |
| **Finished Games By Guests** | 21 |
| **Finished Games By Registered Players** | 3 |
| **Number Of Registered Users Playing The Game** | 1 |
| **Registered Players Total Score** | 79 |

# Collections

- Yellowstone National Park Collection
- Fort Sumter National Monument Collection
- Congaree National Park Collection
- Children's Book Illustration Collection
- Highlights from the Mechanical Curator Collection

# Plugins

- dictionary-StopWordPlugin
- weighting-ScoreNewMatchPlugin

For information about specific games and settings, view the Game Default Settings help guide in the Metadata Games docuementation/ folder.

**4. Activate Institutions' Content Apps**

From the Admin Overview, click Institutions, click the Update icon for an institution, change the status to Active and save; Institutional media is now available to use in the games.

Your system setup is complete. Go to the Arcade and play!

**Appendix 6:  Installation for Content App (mg-content)**

(THIS TEXT IS DUPLICATED FROM OUR GITHUB PAGE:  https://github.com/tiltfactor/mg-game)

 (for latest updates on installation, configuration, and other technical documentation, go to
https://github.com/tiltfactor/mg-content)

**Installation**

- Requirements
- Install Content App
- Running Content App over https
- Troubleshooting

**Requirements**

**LAMP Stack (linux, apache, mysql, php)**

 We are currently using the following:

- Ubuntu 13.10
- Apache 2.4.6
- PHP 5.5.3
- MySQL 5.5.34

**Other things to install**

- SSL cert (if you decide to use https://)

**Check PHP Memory Limit**

Before installation, have a system administrator configure your server's php.ini file to make sure its PHP
memory limit is at least 128 MB. We currently recommend 300 MB or more if you are looking to import
and use more than 10,000 images or are importing audio and/or video media.

- Modify php.ini file
    - On Ubuntu, you can find this in /etc/php5/apache2/
    - memory_limit - change from 128M to 300M or higher to large image sets, and
      audio/video media
    - post_max_size - change from 8M to 220M to accommodate larger media
    - upload_max_filesize - change from 2M to 256M to handle audio and video file uploads
- If running PHP 5.5+

○ Must define date.timezone (e.g., date.timezone # "America/New_York")
○ Reload apache

**Install Content App**

Grab source code

In www/protected/data folder, copy fbvsettings_default.php and save it as fbvsettings.php.

In fbvsettings.php, edit the following line to reflect your current setup:

'mg-api-url' => 'http://LOCATION_OF_GAME_APP/www/index.php/ws/content/wsdl/',


In mg-content folder, go to tools and run fix-perms script.

cd tools
./fix-perms.sh


fix-perms.sh changes group ownership to www-data, which in Ubuntu systems allow the web server access

The following folders and files need www-data group ownership:

assets/
uploads/
protected/runtime/
protected/config/main.php
protected/data/fbvsettings.php
protected/commands/ffmpeg/ffmpeg
protected/commands/ffmpeg/ffprobe


Go to web browser and open URL that you have pointed towards your game app.

http://CONTENT_APP_LOCATION/www/

Click "Proceed with system requirement test" to run a test of server capabilities. This will ensure that your server can support the required Yii framework.

> NOTE: Particular directories and files will need to be writable by the webserver user. On Debian/Ubuntu systems, this user is usually 'www-data' while RedHat and derivatives often use 'apache'. The *fix-perms.sh* script located in the tools/ directory may be of help. Please read the code carefully before use!

## Metadata Games - Requirements Test

### Description

This script checks if your server configuration meets the requirements for running Yii Web applications. It checks if the server is running the right version of PHP, if appropriate PHP extensions have been loaded, and if php.ini file settings are correct.

### Conclusion

Your server configuration satisfies the minimum requirements by Yii. Please pay attention to the warnings listed below as you could rectify them to improve the performance of Metadata Games.

Proceed with database installation

### Test Details

| Name | Result | Required By | Memo |
|---|---|---|---|
| PHP version | Passed | Yii Framework | PHP 5.1.0 or higher is required. |
| $_SERVER variable | Passed | Yii Framework | |
| Reflection extension | Passed | Yii Framework | |
| PCRE extension | Passed | Yii Framework | |
| SPL extension | Passed | Yii Framework | |
| DOM extension | Passed | CHtmlPurifier, CWsdlGenerator | |
| PDO extension | Passed | All DB-related classes | |
| PDO MySQL extension | Passed | All DB-related classes | This is required if you are using MySQL database. |
| ZIP extension | Passed | Recommended to improve the performance and relyablility of imports and exports | |
| Memcache extension | Warning | CMemCache | |
| APC extension | Warning | CApcCache | |
| Mcrypt extension | Passed | CSecurityManager | This is required by encrypt and decrypt methods. |
| SOAP extension | Passed | CWebService, CWebServiceAction | |
| GD extension in Version 2 | Passed | MG Image Resizing | |
| GD extension with FreeType support | Passed | CCaptchaAction | |
| ImageMagick | Warning | Metadata Games recommend to use Image Magick for image resizing. | |
| Ctype extension | Passed | CDateFormatter, CDateTimeParser, CTextHighlighter, CHtmlPurifier | |
| Folder/File Write Permissions | Passed | Path to application root: /Users/boybot/Desktop/website_work/CONTENT-mg-test/www<br><br>The following Folder and files in application root have to be writable:<br>../assets: ok<br>../uploads: ok<br>../uploads/ftp: ok<br>../uploads/images: ok<br>../uploads/scaled: ok<br>../uploads/thumbs: ok<br>../protected/runtime: ok<br>../protected/config/main.php: ok<br>../protected/data/fbvsettings.php: ok<br>../protected/commands/ffmpeg/ffmpeg: ok<br>../protected/commands/ffmpeg/ffprobe: ok | |

| | passed | | failed | | warning |
|---|---|---|---|---|---|

If your server passes the system requirement test, you may then click "Proceed with database installation", bring you to the Database Setup page.

**Database Setup**

You will need to fill out the Database Name, Database User Name, and Database Host Name fields for the database you wish to use. If the database has a password, enter this in the Database Password field as well. If you do not have this information, please contact your system administrator. Leave the Database Host Port field blank. If you have not already created a database for use with Metadata Games, please do so now.

After entering the required information, click "Submit".

**Admin Account and Game App Registration**

On this page, you will register your Content App with the Game app and create a Content App admin account.

At the "Admin Account Setup" page, fill out the following fields:

- Application Name - Your Institution or Organization's name.
- Logo - Upload your Institution or Organization's logo. Although you can put in any size logo, a rectangular shaped graphic 120 pixels or less works best.
- Application URL - URL for your Content App. Don't forget to add www/ to the end of your URL!
- Institution Website - URL for your institution. In certain games, this is the link players select to find more information about your institution and your collections.
- Description - A short description (up to 255 characters) about your Institution.
- Administrator Username - The name of the administrator's account.
- Password - A password for the administrator's account.
- Verify Password - Enter the same password, for confirmation.
- Email - A valid email address for the administrator.
- Ip - IP range at your organization. This is for restricting access to collections. For more details on restricting collection access, see Configuration.

# Metadata Games - Admin Account Setup and MG Game Build Registration

*Fields with * are required.*

**Application Name ***

Name of your organization.

**Logo**
[ Choose File ]  No file chosen

**Application URL ***

Example: http://yourdomain.com/metadatagames/www/
(don't forget to add www/ to your URL!)

**Institution website ***

**Description**

Server Description

**Administator Username ***

**Password ***

Minimal password length 4 symbols.

**Verify Password ***

**Email ***

Institution's IP address range.
You can make use of * as a placeholder for the number range from 0-254 and specify the IP addresses in the following way:

**Single IP Address**
   123.123.123.123
**Multiple IP Addresses**
   **123.123.123.***
      For all IP Addresses in the range from 123.123.123.1 to 123.123.123.254
   **123.123.***
      For all IP Addresses between 123.123.0.1 and 123.123.254.254
   **123.123.123.123,124.124.124.124**
      You can enter multiple ip addresses separated by comma

**Ip ***

[ Save ]

Then click "Save".

Congratulations! You have successfully installed the Content App for Metadata >Games! Now to configure and import media! and then __configure the Game App

# Metadata Games - Further Steps

**Success! The database has been set up and Metadata Games has been installed.**

Now to configure your install of Metadata Games:

**All links below will open in a new tab or window to allow you to return to this list.**

1. Login to gain access to the admin tool.
2. Visit the plugin tool.
3. Create collections and import media.
4. Process media (may need to wait for audio, video media to finish transcoding).

https://github.com/tiltfactor/mg-game/tree/development/documentation/configure_gameapp.md

**Running Content App over https**

If running over https, check that your ServerProfile URL starts with https

**Troubleshooting**

Get Error: Internal Server Error when trying to upload media

- check application.log in protected/runtime/
- check apache log in /var/log/apache2/error.log ** if due to "PHP Fatal error: Call to undefined function json_encode()" *** need to install json extension (php 5.5+ issue). *** sudo apt-get install php5-json

After entering installation data, I'm taken back to the System Requirements page

- check that fbvsettings.php has group perms for www-data.

Trying to transcode audio/video media and I get a 'Invalid data found when processing input:' error

- make sure that ffmpeg and ffprobe in www/protected/commands/ffmpeg/ are executable by owner and group, ie, should have permissions 754.

**Appendix 7:  Content App Configuration**

Once the MG Content App is installed, it's time to configure it:

1. Login to gain access to the admin tool.
2. Create licences to assign to media collections.
3. Create collections and import media.
4. Process media (may need to wait for audio, video media to finish transcoding).

# Metadata Games - Further Steps

**Success! The database has been set up and Metadata Games has been installed.**

Now to configure your install of Metadata Games:

**All links below will open in a new tab or window to allow you to return to this list.**

1. Login to gain access to the admin tool.
2. Visit the plugin tool.
3. Create collections and import media.
4. Process media (may need to wait for audio, video media to finish transcoding).

**1. Login**

Gain access to the Content App admin tools by signing in with your newly-created account at the login screen.

http://CONTENT_APP_URL/www/index.php/user/login

# Login

Please fill out the following form with your login credentials:

*Fields with * are required.*

username or email *

password *

Lost Password?
☐ Remember me next time

Login

You can access the "Admin Overview" page by clicking on "Admin" in the Metadata Games navigation bar at the top of the page. This page contains links to all of the available tools. These links also appear in the Admin navigation bar, underneath the Metadata Games navigation bar.



NOTE: For detailed information about all admin tools, see the Site Administration guide in the Metadata Games documentation/ folder.

**2. Create licences to assign to media collections.**

From the Admin Overview, click Licences.

It's highly recommended to create a licence to assign to your collections. Click Create Licence. Enter a licence name and the terms in the description textbox. Click Create when finished.

Home » Admin » Licences » Create

## Create Licence

*Fields with * are required.*

**Name ***

**Description**

**Created ***
2014-01-24 23:44:43
**Modified ***
2014-01-24 23:44:43

Create

### 3. Create Collections & Import Media

Next, create a collection and import media from your server or local machine by using the "Collections" and "Import" tools.

Media | Import | Collections | Licences | Global Settings | Admin Log | Update DB | Server Profile

Home » Admin » Collections

## Manage Collections

You may optionally enter a comparison operator (<, <=, >, >=, <> or =) at the beginning of each of your search values to specify how the comparison should be done.

Advanced Search

Displaying 1-1 of 1 result.

| | Name | Locked | More Information | Licence | Media | Ip Restrict | |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | All | Item locked | This is the default media set. All media will be automatically assigned to it. It cannot be deleted. | Default Licence | 0 Media | Not active | |

**Actions**
Create Collection

Batch Actions | Go

Powered by Metadata Games software developed by tiltfactor

Although not required, we recommend creating a collection. The process is similar to creating a licence.

Note: Importing media is a two-step process: Import and Process.

NOTE: All images imported into the system must be in the JPEG (.jpg or .jpeg), PNG, or GIF formats. We highly recommend that each image be no larger than 4 MB in size, due to limits in a typical PHP configuration. Furthermore, we recommend that a minimum of 100 images are imported and processed into the system before starting gameplay.)

Home » Admin » **Import**

## Import

Import media using one of the selections below. Then process the images.

### Import media from your computer

Select media(s). This includes the ability to click and drag files to import **(good for small media sets)**.

### Import media that can be found in the server's '/uploads/ftp' folder

Place media in this folder using a SFTP client and let the system do its work **(recommended method for large media sets)**.

### Import media in a ZIP file from your computer

Import .zip compressed archives of media. Currently has a filesize limit of 200 MB.

### Transcoding process of imported media

Once you have imported upload audio and video files into the system, here you will see the transcoding progress.

### Process imported media

Once you have imported media into the system, use this to process them.

See the Site Administration guide in the Metadata Games documentation/ folder for more information.

**4.Process media**

NOTE: Upon import, audio and video media are automatically transcoded and split into 20-second clips. Transcoding must finish before processing. You can view transcoding process from Admin/Import/Transcode page.

Once your media has been imported or transcoded, click Import / Process

- check the collections you would like to put the media into
- at bottom of page, click on "Selected Media" drop-box and select "first 300", then click Process_Media

Configuration is complete: now to [configure the Game App]((https://github.com/tiltfactor/mg-content/blob/development/documentation/configure_gameapp.md).

**Appendix 8: Metadata Games API Documentation**

**Table of Contents**

**Purpose**

The following document explains how to use the Metadata Games API. The API has been developed to allow the implementation of HTML(5), CSS, and JavaScript based games that will make use of the Metadata Games platform and facilitate research into crowd-sourcing metadata. The goal of the API is to make the use of Metadata Games independent from the specific implementation of the arcade.

**API security & filters**

The API is implemented as a module within the Yii framework that defines its functionality via controllers and their actions.

To increase security, the API makes use of Yii action filters and other measures, as described below. When extending the API, be sure to set the necessary filters or amend the existing controller's filter rules.

All API requests should be made via XMLHttpRequest objects, and include the header X_REQUESTED_WITH set to XMLHttpRequest. We recommend using jQuery's $.ajax(), which applies this header automatically.

To increase security and make spoofing more complex, any application wishing to use the API must obtain a shared secret as described below. Any requests made to functions with the sharedSecret filter must include this shared secret in the header HTTP_X_MG_API_SHARED_SECRET.

*To simplify development, we have developed a JavaScript module that handles many of these details internally, including retrieving the shared secret and signing AJAX requests with the necessary headers. Games and other applications wishing to use the API should extend this module, which can be found at www/js/mg.api.js.*

**Filters**

The API implementation makes use of the following filter:

- throttle: Limits the rate at which a function can be called.
- *When triggered:* returns HTTP status 420
- IPBlock: Blocks a function for certain IP addresses.

- *When triggered:* returns HTTP status 403 (Forbidden)
- APIAjaxOnly: Requires requests to be made as AJAX requests.
- *When triggered:* The filter will not return an error status; instead it redirects all non-AJAX traffic to the API module's default controller which displays a short message that the API can only be accessed via AJAX requests.
- accessControl: Requires the requestor to be an authenticated user (i.e: the requestor must have logged in during the current session).
- *When triggered:* returns HTTP status 403 (Forbidden)
- sharedSecret: Requires requests to be signed with the shared secret HTTP header.
- *When triggered:* returns HTTP status 420

**API specification**

The following listing describes all callback functions and their behavior. Functions are called by sending GET/POST requests to [base_url]/index.php/api/.... In general, each API callback responds in JSON or throws exceptions coded with HTTP statuses. Each JSON response includes a status field that can either be "ok" or "error". In the case of an error, additional information may be provided by the errors or responseText field.

General API

- user/sharedSecret
- games
- games/scores

User management API

- user/register
- user/login
- user/logout
- user/update
- user/recoveryPassword
- user/socialLogin

Gameplay API

- games/play
- games/abort
- games/abortPartnerSearch
- games/messages
- games/postMessage
- games/gameapi
- games/reset

- games/saveLog

---

**General API**

The following functions are general functions unassociated with specific usage.

**api/user/sharedSecret**

Returns a shared secret for the user that will be saved in the session. Other API requests should be signed with a shared secret header as described above.

HTTP method: GET

Filters: IPBlock, APIAjaxOnly

Response:

```
{
 "status":"ok",
 "shared_secret": <secret>
}
```

api/games

Returns a list of all games available in the system.

HTTP method: GET

Filters: throttle, IPBlock, APIAjaxOnly, sharedSecret

Response:

```
{
 "status": "ok" OR "error",
 "games": [
  {
    "name": "",           // name of game
    "description": "",       // description of the game
    "arcade_image": "",      // file name of the arcade image
```

```
    "gid": "",              // unique game id (string)

    "url": "",              // path to the game (from base url)

    "image_url": "",           // path to the arcade image (from base url)

    "api_base_url": "",       // base url of the API

    "arcade_url": "",         // full URL to the ARCADE

    "base_url": "",           // base url

    "game_base_url": "",      // base url of the game (a game can be

                            //  loaded via game_base_url + gid),

    "user_name": "",            // name of player if logged in

    "user_num_played": 0,        // number of times the player

                            //   played the game

    "user_score": 0,            // score of the authenticated player

    "played_against_computer": false, // true if game is against a computer

    "user_authenticated": false,     // true if user is authenticated


    // may be more fields, dependent on game implementation
  },
  ...
 ]
}
```

api/games/scores

Returns an array of the 10 users with the highest scores.

HTTP method: GET

Filters: throttle, IPBlock, APIAjaxOnly, sharedSecret

Response:

```
{
 status:"ok" OR "error",
 scores: [
  {
```

```
    id: 0,

    username: "",

    score: 0,

    number_played: 0

  },

  ...

  ]

}
```

User Management API

The following functions are associated with authenticating and managing users.

api/user/register

Verifies the request data, and if the data is valid, registers a new user.

HTTP method: POST

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request:

```
{
 username: "",
 password: "",
 email: "",
 verifyPassword: ""
}
```

Response:

```
{
 status: "ok" OR "error",
 responseText: ""
```

}

api/user/login

Verifies the password and if valid, logs the given user in.

HTTP method: POST

Filters: IPBlock, APIAjaxOnly

Request:

```
{
  login: "",
  password: "",
}
```

Response:

```
{
  status: "ok" OR "error",
  errors: {}          // only defined if status == "error"
}
```

api/user/logout

Logs out the current user (if any).

HTTP method: GET

Filters: IPBlock, APIAjaxOnly, accessControl, sharedSecret

Response:

{status: "ok"}

api/user/update

Updates user info. All fields must be included in the request, even if they are not being updated.

HTTP method: POST

Filters: IPBlock, APIAjaxOnly, accessControl, sharedSecret

Request:

```
{
  username: "",
  password: "",
  email: ""
}
```

Response:

```
{
  status: "ok" OR "error",
  responseText: ""
}
```

api/user/recoveryPassword

Sends a password recovery link to the given email address (if that email has been registered to a user).

HTTP method: POST

Filters: IPBlock, APIAjaxOnly, accessControl, sharedSecret

Request:

```
{email: ""}
```

Response:

```
{
  status: "ok" OR "error",
  responseText: ""
}
```

api/user/socialLogin/provider/(PID)/api_key/(KEY)

Initiates login via the given social network provider.

HTTP method: GET

Filters: throttle, IPBlock, APIAjaxOnly, accessControl, sharedSecret

Request: URL parameters:

- PID: The provider ID string. Valid providers ID include google, facebook, linkedin, yahoo, and live
- KEY: the api key for the given provider

Response:

```
{
  status: "ok" OR "error",
  responseText: ""
}
```

Gameplay API

The following functions are used within games to send and receive content.

api/games/play/gid/(GID)

Handles play requests and updates to a game. Accepts both GET and POST requests; GET requests initialize a new game session, while POST requests are used for sending responses and getting the next round.

Either variety of request may have to be repeated if the game is a two-player game and the player is forced to wait for a second player.

HTTP method: GET/POST

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request: URL parameters:

- GID: the unique game ID string

Data for POST requests:

```
{

turn: 2          // the current turn

played_game_id: 1  // the id in the database representing this played game

submissions: [    // submission format is game-specific, but includes these:

  {

    image_id: 0   //  - id of the image that has been tagged

    tags: []      //  - string of submitted tags

  }

],

...             // further fields may be added based on implementation

}
```

Response:

When initializing a two-player game (GET) and a second player is not available, the response status will be "retry". Similarly, when submitting a turn (POST) in a two-player game, the response status for the first player will be "waiting".

If the status is "ok", the response will include the full JSON below.

```
{

 status: "ok" OR "error" OR "retry" OR "waiting",

 errors: {},           // if status == error

 game: {

  // The following fields are available in all games.

  unique_id: "",

  played_game_id: "",    // Note: played_game_id is distinct from session_id

  name: "",

  description: "",

  more_info_url: "",
```

```
  base_url: '',

  play_once_and_move_on: 0,

  turns: 4,

  user_name: null OR "",

  user_score: 0,

  user_num_played: 0,

  user_authenticated: false,

  ...

  // Additional game fields in are game-specific

},


turn: {

  score: 0, // previous turn's score

  tags: {   // previous turn's tags

    "username": [

      {

        tag: "",

        original: "", // set if submitted tag differs from other tags

        score: 1,    // score of this tag

        weight: 1

      },

      ...

    ],

    ...

  },


  images: [

  {

      // all urls are relative to game.base_url

      full_size: "",

      scaled: "",

      thumbnail: "",
```

```
      licences: [0, ...] //id(s) of image licences
      id: 1 // the id of the image in the database
    },
    ...
  ],


  // All possible licences
  licences: [
   {
    id: '',
    name: '',
    description: '',
   },
    ...
  ],
   ...
  // turn may have more fields created by plugins or similar, such as:
  wordsToAvoid: ["dog", "house", "car"]
 }
}
```

Throws HTTP 400 exception if the played_game_id (specified in POST requests) cannot be found, or if the submission cannot be parsed.

api/games/abort/played_game_id/(ID)

Aborts the game identified by the ID and notifies the opponent (if one exists) that the user has left the game.

HTTP method: GET

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request: URL parameters:

- ID: unique played_game ID, used to keep track of the current game session

Response: If successful, returns {status:'ok'}. Throws an HTTP 400 error (Bad Request) if played_game_idcannot be found.

api/games/abortPartnerSearch/game_partner_id/(ID)

Aborts the partner search in progress, sending the potential partner (if one exists) an abort message.

This method is also used to skip the "Waiting for other player" screen and play instantly against the computer, if the game allows this option.

HTTP method: GET

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request: URL parameters:

- ID: user ID of potential partner

Response: If successful, returns {status:'ok'}. Throws an HTTP 400 error (Bad Request) if played_game_idcannot be found.

api/games/messages/played_game_id/(ID)

Returns messages for the user playing the game identified by played_game_id.

HTTP method: GET

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request: URL parameters:

- ID: unique played_game ID, used to keep track of the current game session

Response:

```
{
 status: "ok" OR "error",
 messages: [
  {message: ""},
  ...
 ]
}
```

api/games/postMessage/played_game_id/(ID)

Leaves a message for the opponent. The message may be an object encoded in JSON.

HTTP method: POST

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request:

{message: ""}

Response: If successful, returns {status:'ok'}. Throws an HTTP 400 error (Bad Request) if played_game_idcannot be found.

api/games/gameapi/gid/(GID)/played_game_id/(ID)

Calls the specified method within the game engine. The request may include parameters to be passed to the game engine. This allows games to extend the API with further game-specific functionality.

HTTP method: POST

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request: URL parameters:

- GID: the unique game ID string
- ID: the played game session ID

POST request data:

{
 call: {
  method: ""
 }
 parameter: null OR {} // this object is passed as an argument to the method
}

Response:

```
{
  status: "ok" or "error",
  response: {}     // varies based on the method called
}
```

Throws an HTTP 400 exception if the played_game_id cannot be found.

api/games/reset/gid/(GID)/played_game_id/(ID)

Resets the game and returns a new played_game_id. *Note:* this only needs to be called for games that do not reload between game sessions.

HTTP method: GET

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request: URL parameters:

- GID: the unique game ID string
- ID: the played game session ID

Response:

```
{
  status: "Score saved successfully",
  played_game_id: 0
}
```

api/games/saveLog/gid/(GID)

Saves the included gameplay log to the server.

HTTP method: GET

Filters: IPBlock, APIAjaxOnly, sharedSecret

Request: URL parameters:

- GID: the unique game ID string

POST request data:

```
{
 eventlog: {} // This object will be stored as a JSON file on the server.
}
```

Response: None.

Gameplay flow

Single-player

- Client initializes game with GET request to games/play.
- Server responds with game and turn data.
- Player completes turn.
- Client sends turn data as POST request to games/play.
- Server responds with next turn data.
- (and so on...)

Two-player

- Client initializes game with GET request to games/play.
- Server checks status of other players.
- *If a player is waiting:* Server responds with game and turn data.
- *If no player is waiting:* Server responds with "retry" status.
- *If client receives "retry" status:* Send GET request again, with time constraint.
- *If time is exceeded:* Server sets up game with computer and responds with turn data.
- Client can also skip the retry cycle and play against computer by calling games/abortPartnerSearch.
- Player completes turn
- Client sends turn data as POST request to games/play
- *If other player is waiting:* Server reponds with next turn data, and sends message to waiting player.
- *If other player is not waiting:* Server responds with a "waiting" status.

Appendix 9: Alternate Strategies for Metadata Games

Metadata games is a powerful system, but adoption has long been a key challenge among institutions, even with national informative events such as the NEH-sponsored "Engaging the Public" workshop in 2015. That project in fact conducted many surveys across professions and institutions within the museum and library science field, and found that a large majority were interested in using Metadata Games, but there were a number of institutional barriers they had to face in committing to crowdsourcing projects, even with a the low barrier of entry that Metadata Games currently offers.

Our team wanted to finalize the project by addressing this *significant barrier to entry*.
We asked, "What if there was no need for any type of software installation in order to contribute to archives?"

In December of 2015 we began planning on a lightweight system for mobile phones that would be installation free and address user needs instead of institutional motivations. This system combines the ease of end user interface with an easy to export data model.
In partnership with the National Archives, we created "r-kive," a non-game crowdsourcing tool that makes it easy for people to describe and search their own images on their phones. Occasionally, in between tagging their own images, users are asked to tag an image from the United States' National Archives. These tags are sent back to the National Archives database in order to make those images searchable by the public and further enhance the National Archives database.

"R-kive" is a photo-tagging app for iOS (also for Android a plus), conceived to have a built-in photo browser. The app will allow the user to quickly and easily apply tags to images on their phone, allowing textual tag input, as well as quick one-tap selection of previously used tags. Interspersed among the user's images, the user will occasionally be asked to tag an image from a public collection, accessed via an API, and the data will be sent back to the collection to further enhance their database.

Train for Civil Defense
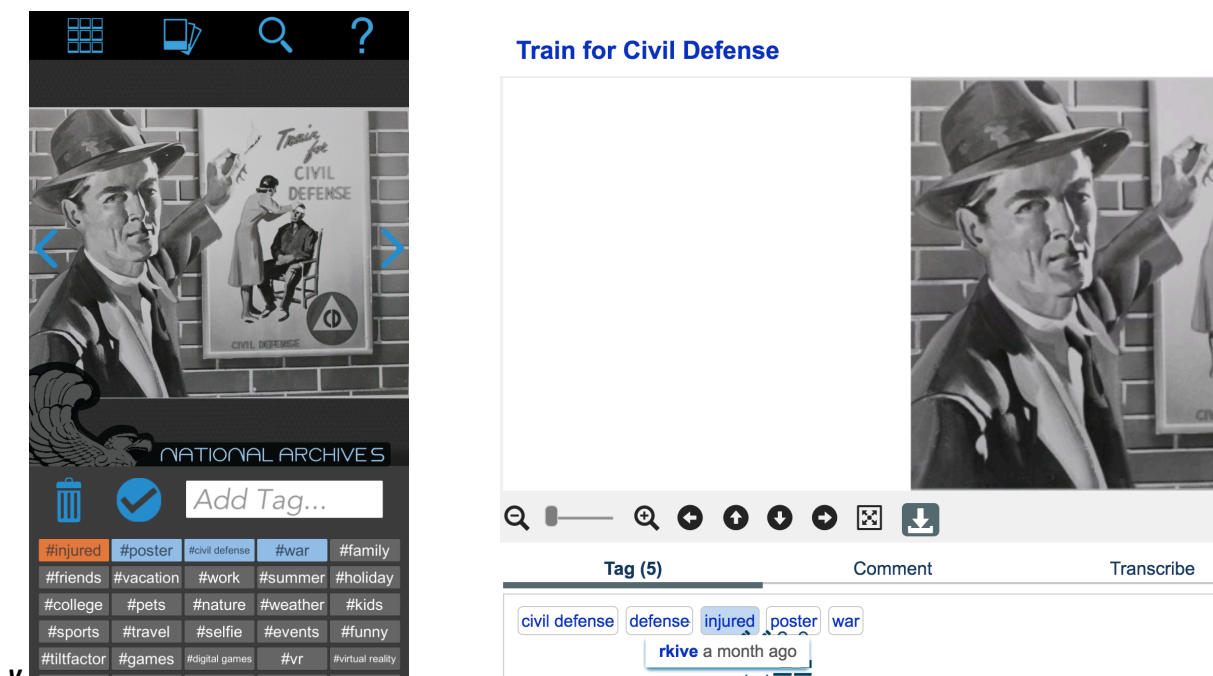
(left: screenshot from beta-build of r-kive; right: screenshot from National Archives, where user's tags from r-kive are included)

Core Features

- Text input tagging of images on phone
- One-tap tagging of images on phone using common and previously used tags
- In-app browsing of images with particular tags, combinations of tags, etc.
- Embed tags in image metadata so that it can be accessed and searched outside the app (in the native photos app, or even when exported)
- Share an image with its tags, or share all images with certain tags (i.e. in-app photo browser search results) to social media
- Ability to share videos in a similar way

Appendix 10: All Publications

Geoff Kaufman, Mary Flanagan, and Sukdith Punjasthitkul. 2016. "Investigating the Impact of 'Emphasis Frames' and Social Loafing on Player Motivation and Performance in a Crowdsourcing Game." *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16).* **ACM, New York, NY, USA, 4122-4128. DOI=http://dx.doi.org/10.1145/2858036.2858588**
In this paper, we aimed to study and understand how to motivate and sustain high levels of voluntary contribution in crowdsourcing game activities, and in particular, those created for the public good or altruistic causes. Our team studied online participants across two study designs to compare the impact of various 'emphasis frames,' highlighting distinct intrinsic motivational factors, used to describe an online game in which players provide descriptive metadata 'tags' for digitized images. The study on emphasis frames showed that emphasizing group contributions (contributing along with a 'growing community of players'), solicited significantly fewer contributions than did frames emphasizing personal enjoyment or altruistic motivations. A second study tested the hypothesis that this lower level of contribution could be a result from the phenomenon called social loafing, which is the tendency to exert less effort in collective tasks in which contributions are a group of anonymous individuals. Compared to a no-frame control condition, a frame that focused on the prevalence of other players reduced contribution levels and game replay likelihood, whereas a frame that emphasized the scarcity of other players increased contribution and replay levels. The paper additionally discussed strategies for counteracting social loafing in crowdsourcing contexts.

Manzo, C., Kaufman, G., Punjasthitkul, S., & Flanagan, M. "'By the People, For the People': Assessing the Value of Crowdsourced, User-Generated Metadata." Digital Humanities Quarterly, 9(1), 2015.
With the growing volume of user-generated classification systems arising from media tagging-based platforms (such as Flickr and Tumblr) and the advent of new crowdsourcing platforms for cultural heritage collections, determining the value and usability of crowdsourced, "folksonomic," or user-generated, "freely chosen keywords" for libraries, museums and other cultural heritage organizations becomes increasingly essential. The present study builds on prior work investigating the value and accuracy of folksonomies by: (1) demonstrating the benefit of user-generated "tags" – or unregulated keywords typically meant for personal organizational purposes – for facilitating item retrieval and (2) assessing the accuracy of descriptive metadata generated via a game-based crowdsourcing application. In this study, participants (N = 16) were first tasked with finding a set of five images using a search index containing either a combination of folksonomic and controlled vocabulary metadata or only controlled vocabulary metadata. Data analysis revealed that participants in the folksonomic and controlled vocabulary search condition were, on average, six times faster to search for each image (M = 25.08 secs) compared to participants searching with access only to controlled vocabulary metadata (M = 154.1 secs), and successfully retrieved significantly more items overall. Following this search task, all participants were asked to provide descriptive metadata for nine digital objects by playing three separate single-player tagging games. Analysis showed that 88% of participant-provided tags were judged to be accurate, and that both tagging patterns and accuracy levels did not significantly differ between groups of professional librarians and participants outside of the Library Science field. These

findings illustrate the value of folksonomies for enhancing item "findability," or the ease with which a patron can access materials, and the ability of librarians and general users alike to contribute valid, meaningful metadata. This could significantly impact the way libraries and other cultural heritage organizations conceptualize the tasks of searching and classification.

Kaufman, G., Flanagan, M., and Punjasthitkul, S. "Exploring the impact of 'emphasis frames' on player motivation and performance in a crowdsourcing game." In Proceedings of the 2014 Meaningful Play Conference.

Relatively little empirical work has systematically verified the claims regarding crowdsourcing games as more 'fun or productive' than other crowdsourcing interfaces, and fewer still have identified the psychological factors that might impact the motivation to play crowdsourcing games to encourage better data. Study 1 (N = 97) compared the number of individual tags contributed by players who were shown, prior to play, one of three game "frames" emphasizing distinct motivators identified by prior research. Study 2 (N = 148) tested this hypothesis by comparing the social norm frame used in Study 1 with two new frames that combined the language of the original frame. The findings demonstrate the powerful impact of emphasizing distinct motivational factors when presenting a game to players, and illustrate the potentially detrimental impact of highlighting descriptive norms for participation in crowdsourcing. The research suggests that one effective means of counteracting social loafing in crowdsourcing is to make salient the value of users' contributions or by stressing the value of users' unique perspectives for contributing.

Flanagan, M., Punjasthitkul, S., Seidman, M., Kaufman, G. and Carini, P. "Citizen Archivists at Play: Game Design for Gathering Metadata for Cultural Heritage Institutions." Proceedings of DiGRA 2013, Atlanta, Georgia, August 2013.

This overview of the Metadata Games project explains the potential role of games in collecting valuable information about archival media through crowdsourcing. Challenges are discussed, including maximizing the player audience, ensuring high replayability, and verifying the accuracy of publicly generated data. The authors ultimately present the "Outlier Design" model used to identify and address these challenges.

Flanagan, M. & Carini, P. (2012). "How games can help us access and understand cultural artifacts." American Archivist 75(2), pp 514-537.

As libraries and archives seek to digitize millions of items, institutions struggle to collect quality, relevant metadata–the informative tags regarding an item's content, context, and creation. Reporting on a pilot study of Metadata Games, this paper elaborates on the utility games in collecting metadata, and the potential connection fostered between such rich archival data and a diverse user base which includes researchers, hobbyists, and of course, gamers!

Appendix 11: Presentations & Talks

Selected Presentations

Keynote: "Connected Play," Oxford Internet Institute's Connected Life conference Oxford UK 21 June

"Feedback and timing in a crowdsourcing game." Gili Freedman, Sukie Punjasthitkul, Max Seidman, Mary Flanagan, Human Computation, Austin Oct

"Solving the Feedback Problem in Crowdsourcing Games: Design Lessons from Smorball ," Max Seidman, Gili Freedman, and Mary Flanagan, Meaningful Play Conference, East Lansing 20-22 Oct

"Crowdsourcing of image metadata: Say what you see." Presentation at Open Repositories 2015 (OR 2015), in collaboration with University of Edinburgh (June 2015, Indianapolis).

"Diversity in Audience, Diversity in Creators," IndieCade East Festival, American Museum of the Moving Image 15 Feb 2015 (Keynote)

"Embedded Design for Social Innovation," Segal Design Institute, Segal Seminar Series, Northwestern University December 2015

"Games that Change the World: What's Possible?" Bergen Norway Public Library, September 2015

"Ludics Seminar," Department of the Classics, Harvard University September 2015

"The Psychology of Interventionist Design," School of Visual Arts, March 2015

"Humanist Games: Playful Systems for Critical Thinking," Fordham Univ. Inaugural Digital Media Lecture Series March 2015

Keynote: "Creating a #CrowdCON," Engaging the Public: Best Practices for Crowdsourcing Across the Disciplines." University of Maryland 6-8 May.

"Critical Play and Embedded Design," Carnegie Mellon Feb 2016

Metadata Games: Engaging "citizen archivists" through the power of play. Talk presented at the March 2015 meeting of the Federal Community of Practice for Crowdsourcing and Citizen Science (FCPCCS). 03/27/2015 http://www2.epa.gov/innovation/federal-community-practice-crowdsourcing-and-citizen-science

DEMOS AND EXHIBITIONS

Metadata Games demo at City University of New York (CUNY) Games Festival (January 2015, New York City). http://gamesfest2015.commons.gc.cuny.edu/
Author/Presenter: Geoff Kaufman

Metadata Games demo at Meaningful Play Conference (Michigan State University, Lansing, MI). October 2014 http://meaningfulplay.msu.edu/

KEYNOTE "Freedom at Play in Digital Games," Philosophy of Computer Games Istanbul 13-15 November

KEYNOTE "Who Plays?" RE:Humanities'14: Play, Power, Production #rehum14 Haverford College April

KEYNOTE "Playing with your Metadata," WebWise, Institute of Museum and Library Services (IMLS) Innovation Conference, Baltimore February

"Values at Play in Smart Technologies," University of Toronto September

"Methodologies to Study Games," University of Toronto September

KEYNOTE "Making a Difference in and through Playful Design," Computer Supported Cooperative Work Annual Conference (ACM) Baltimore February

"METADATA GAMES: Enhancing Metadata With the Power of Play", Making the Most of Metadata - British Library Labs Data Days, London February
http://labs.bl.uk/Making+the+Most+of+Metadata+-+British+Library+Labs+Data+Days

"Humanities Crowdsourcing," Crowds & Games Summit (which included a White House OSTP meeting)

"Citizen Archivists at Play: Game Design for Gathering Metadata for Cultural Heritage Institutions," Digital Games Research Association, Atlanta Georgia August

"3 Stories of Social Change," Business Innovation Factory, Providence September

KEYNOTE "Tales of Transformation & Creative Entrepreneurship," Trinity College, Dublin Sept

KEYNOTE "Different Games," Different Games Conference, NYU Polytech NYC 26 April

"Critical Design," The New School for Social Research, Design and Technology Program, December

"Three Stories of Social Impact," Comparative Media Studies MIT November

"Play and Aesthetics," The Society for Literature, Science, and the Arts Annual Conference Milwaukee September

"Critical Design," The New School for Social Research, Design and Technology Program, December

"Three Stories of Social Impact," Comparative Media Studies MIT November

"Playing for Change," Dartmouth Alumni talk, Hanover NH February

KEYNOTE "Humanist Design," Keynote, Georgia Tech's Digital Media Program - Yesterday & Today, 16 April 2012

"Digital Humanities and Games," Upper Valley Alumni Panel, NH October

"Critical Play: Panel at UC-Santa Cruz October

"Senior Faculty Thought Leader" Panel, Dartmouth College September

"Serious Play," University of Tampere Finland September

"Art and Science," Distinguished Lecture, Dept of Computer Science UNC, Charlotte 27 April

"TransTalks: Practice Makes Practice," Transdisciplinary Design Program, Parsons NYC March

"Augmenting Artifacts through the Wisdom of Crowds," Meaningful Play Conference, Michigan State University Oct 18 2012

"Serious Play," University of Tampere Finland September

Appendix 12: PRESS

Blackwell, Jeffrey. "A Playful Turn for Libraries." *Harvard Gazette* 8 Jan 2016
http://news.harvard.edu/gazette/story/2016/01/a-playful-turn-for-libraries/

Ennis, Matt. "Wisdom of the Crowd | Digital Collections." Library Journal, July 13, 2015.

Knowles, Claire. "'Innovation': the Emperor's new clothes?" University of Edinburgh Library Labs Blog, May 20, 2015.

Dempsey, Anne. "ODH Project Director Q&A: Mary Flanagan." Office of Digital Humanities, May 4, 2015.

Flanagan, Mary. "Expanding our Wikiverse: How You Can Save Libraries With Just a Few Clicks." OZY.com, 27 May 2014 http://www.ozy.com/c-notes/curating-the-digital-humanities/31551.article

Gelli, Bianca. "Readers Save Legacy Library Content" Gamification Corp., May 12th, 2014.

Hardy, Molly. "Digitizing the Visual Records: AAS Plays Metadatagames." Past is Present: the American Antiquarian Society Blog, March 4, 2014.

Mauro, Sari. "Metadata games." Congregational Library & Archives: History Matters, February 11, 2014.

Groves, Kaylyn. "Metadata Games Crowdsources Data Collection through Gaming." Association of Research Libraries, January 24, 2014.

Zeamer, Vicky. "Using games to collect metadata: Introducing Metadata Games." Digital Public Library of America (DPLA) blog, January 23, 2014.

"Game adds metadata to digital collections," The Dartmouth, January 22, 2014.

"Tiltfactor presents Metadata Games: Mobile!" Press Release, January 22, 2014.

Knowles, Claire. "Weekend with the Gallimaufry: Edinburgh University images added to Metadata Games. 8 December 2014. http://libraryblogs.is.ed.ac.uk/blog/2014/12/08/weekend-with-the-gallimaufry-3300-images-added-to-metadata-games

AAS. "Come Play with US: AAS Collections Launch in Metadata Games." September 2014. http://americanantiquarian.org/Almanac/2014Sept

Liu, Shu, and McKinley, Matthew. "AnteaterTag: Crowdsourcing Metadata in Games."

October 27, 2014 LITA Forum Poster Session.
http://www.ala.org/lita/sites/ala.org.lita/files/content/2014%20Poster%20Sessions%20rev%2020141027.pdf

Lee, Susanna. "Metadata Games." Theory and Practice of Digital History. October 31, 2014
http://susannalee.org/dh/2014/10/31/metadata-games/

Parasnis-Samar, Anjalis. "Crowdsourced Metadata Games: A Primer." Information Space, Syracuse University School of Information Studies. October 10, 2014.

http://infospace.ischool.syr.edu/2014/10/10/crowdsourced-metadata-games-a-primer/
"Crowdsourcing with Metadata Games." Art Libraries of North America – Mountain West Chapter Blog, September 18, 2014.

http://mwartlibraries.wordpress.com/2014/09/18/crowdsourcing-with-metadata-games/
American Antiquarian Society. "Come Play with Us: AAS Collections Launch in Metadata Games." Almanac, Issue 88. Page 3. September, 2014.

http://americanantiquarian.org/Almanac/2014September.pdf
Baker, Penny. "The Gamification of the Clark's David A. Hanson Collection" Museum Archivist, Volume 24, Issue 2. Page 8. August 13th, 2014.

http://www2.archivists.org/sites/all/files/MAS%20Newsletter%20Summer%202014.pdf

Owens, Trevor. "The Metadata Games Crowdsourcing Toolset for Libraries & Archives: An Interview with Mary Flanagan." *The Signal Digital Preservation blog, Library of Congress.* April 3, 2013.

Marre, Vickie. "Playing Games with Metadata." *Weigle Information Commons blog, University of Pennsylvania.* September 4, 2012.

Karasic, Vickie. "Playing Games with Metadata." PennWIC. 4 September 2012. https://pennwic.wordpress.com/2012/09/04/playing-games-with-metadata/

Lifson, Amy. "Noteworthy: Save the Data!" *Humanities* 32 (4) August 2011, 52.

Richards, Barbara. "Digital game helps tag College photo archives." *The Dartmouth*, May 25, 2011

"Dartmouth Creates Game to Tag Archival Gems." *History News Network,* May 24, 2011

Mattera, Alexis. "Dartmouth's New Metadata Game Makes Tagging Archives Fun." *Scholarships.com*. 24 May 2011.http://www.scholarships.com/Blog/college-news/dartmouths-new-metadata-game-makes-tagging-archives-fun/2642/

Howard, Jennifer. "Gaming the Archives," *The Chronicle of Higher Education*. 23 May 2011. http://chronicle.com/blogs/wiredcampus/gaming-the-archives/31435

Blog Post Features

US HOLOCAUST MEMORIAL MUSEUM TO ADD COLLECTION TO METADATA GAMES

http://www.tiltfactor.org/us-holocaust-memorial-museum-to-add-collection-to-metadata-games/ Tiltfactor Staff 03/23/2015

"Dartmouth College's Tiltfactor, an interdisciplinary innovation studio, is excited to announce new work with collections from the United States Holocaust Memorial Museum. A living memorial to the Holocaust, the United States Holocaust Memorial Museum inspires citizens and leaders worldwide to confront hatred, prevent genocide, and promote human dignity. The United States Holocaust Memorial Museum will work with Tiltfactor to use Metadata Games, an open source crowdsourcing game platform, to collect data on a select subset of its collection of 89,000 historical photographs."

WEEKEND WITH THE GALLIMAUFRY: UNIVERSITY OF EDINBURGH COLLECTION ADDED TO METADATA GAMES

http://www.tiltfactor.org/weekend-with-the-gallimaufry-university-of-edinburgh-collection-added-to-metadata-games/ Tiltfactor Staff 12/8/2014

"Tiltfactor and the University of Edinburgh, Library and University Collections are excited to announce the addition of over 3,300 images from the University of Edinburgh to Metadata Games. This collection, a miscellaneous "gallimaufry" (a confused jumble or medley) of digitized items from Special Collections, displays the sheer variety and breadth of material held by the Centre for Research Collections."

GAME CHANGER

http://www.tiltfactor.org/game-changer/ Tiltfactor Staff, November 7, 2014

Update on Metadata Games project and related initiatives resulting from the project, such as the Crowdsourcing Consortium for Libraries and Archives (CCLA) funded by the IMLS and developing transcription games with the Biodiversity Heritage Library (BHL).

Collaborations, National Involvement & Other Pursuits

This project has served as a national resource in the crowdsourcing space, for it not only provided open source, well document reusable content, but it also generated scores of direct and indirect collaborations.

The National Digital Platform, IMLS FOCUS Thinktank at IMLS IN DC April 2015

Dr. Flanagan was invited to attend a high-level meeting by the Institute of Museum and Library Services (IMLS). This small meeting of approximately 50 colleagues focused on national digital initiatives and the desired impacts of federal funding for libraries. In response to this meeting, and with the success of the Metadata Games platform, the Tiltfactor team submitted two new proposals: one to the Biodiversity Heritage Library in St. Louis (a consortium of natural botanical history libraries), and a second to the IMLS in the form of a National Forum grant. Both projects were funded and add to the knowledge, expertise, and productivity of our team.

The forum project, "Creating a Crowdsourcing Consortium for Libraries and Archives (CCLA)," has the goal of uniting the leading-edge technology groups in libraries and archives across the United States in a conversation about best practices, shared toolsets, and strategies. The Crowdsourcing Consortium for Libraries and Archives (CCLA) had a large meeting cosponsored with the NEH and SLOAN in order to meet the pressing need to unite the leading-edge technology groups in libraries and archives across the United States in a conversation about best practices, shared toolsets, and strategies. The Crowd Consortium initiative is hosting a series of meetings and webinars to collect, examine, and share the most recent, cutting-edge technologies, tools, and platforms and accompanying best practices in the field. See the work from this consortium up at: **http://www.crowdconsortium.org**

"r-kive: Tagging for fun and helping the National Archives" (Spring 2016 - Fall 2016)
Crowdsourcing dialogue during the National Forum Workshop series led us to work with the National Archives and Records Administration (NARA) by collaborating on the creation of a fun and useful tagging app called "r-kive". r-kive accesses a user's native photo roll on IOs or Android devices and allows for quick tagging of personal photos and searching for specifics tags. Randomly interspersed into the app are images from NARA's database that users are encouraged to add tags to and thereby contribute to the public record of these images. New metadata associated with the NARA images is sent back through the app into the NARA database and becomes part of the archives metadata.

"Purposeful Gaming and the Biodiversity Heritage Library: Playfully Crowdsourcing Transcription"
   (Spring 2015 - 2016)
Metadata Games focus led us to work with the Biodiversity Heritage Library through a direct collaboration with the Missouri Botanical Garden (MOBOT) team. Funded by a grant by the Institute of Museum and Library Services (IMLS), the aim of the work is to test new means of using crowdsourcing and gaming to support the enhancement of texts from the Biodiversity Heritage Library (BHL). Tiltfactor is involved in the design and creation of two online transcription games whose aim is to collect quality data and ultimately improve access to digital texts through crowdsourced data enhancement tasks for data found within the BHL's manuscript collections. The two games we designed are called *Beanstalk*, and a game that is focused on a game-playing constituency called *Smörball*.

University of Edinburgh's Library Labs (Spring 2015 - 2016)
The Edinburgh team used metadata games and we shared data, experiences with creating crowdsourcing games, and more. Their team, housed at the University of Edinburgh's Library and University Collections, we among the key institutions who exported tags from the Metadata Games platform and integrated this

data back into their permanent collections. The University of Edinburgh's integration experiences and early data were presented in a joint talk at Open Repositories 2015 in Indianapolis, Indiana.

US Holocaust Memorial Museum (2015)

http://www.tiltfactor.org/us-holocaust-memorial-museum-to-add-collection-to-metadata-games/
This collaboration involved using Metadata Games to collect data on a select subset of its collection of 89,000 historical photographs.

WGBH (2015)

We shared resources and our past proposals and documentation with collaborators to help them create their crowdsourcing project.

Crowdsourcing Consortium for Libraries and Archives (Crowd Consortium) (2014-2015)

The "Engaging the Public" project in 2015-2016, with faculty at the University of Maryland, was able to hold a national convening with the support of the NEH, with IMLS and Sloan Foundation support. "Engaging the Public: Best Practices for Crowdsourcing Across the Disciplines" united the leading-edge technology groups in libraries and archives across the United States in a conversation about best practices, shared toolsets, and strategies. From these efforts, the resulting Crowdsourcing Consortium for Libraries and Archives (CCLA) aimed to meet the pressing need to unite the leading-edge technology groups in libraries and archives across the United States in a conversation about best practices, shared toolsets, and strategies. Together, consortium members addressed the central question, "How might institutions best adopt and employ crowdsourcing strategies for use in collecting metadata, integrating data into existing collections, and increasing user engagement?"

As part of that work we launched the http://www.CrowdConsortium.org. That event was documented in very detailed, freely available proceedings.